Menlo Park Notebook #53 [N-80-03-14], Cat. 967

This notebook covers the period March-July 1880 and contains 288 numbered pages. It is one of two journals kept by Charles P. Mott, which record daily activities at the Menlo Park laboratory (see also Menlo Park Notebook #117). There are also six pocket notebooks that were probably used to record these daily activities prior to their being entered, sometimes in expanded form, into the larger notebooks (see Pocket Notebooks). This journal begins approximately one month before the earliest extant pocket notebook. However, the last pocket notebook contains entries for the period January-March 1881, which are not found in the journals. Some of the entries in the journals are cross-referenced to the experimental notebooks. Together, these books provide a narrative record of the last active year of the Menlo Park laboratory up to the time that Edison moved to New York City.

Missing page number: 158.

N-50-03-14 1

IRIDOSMINE. IRIDOSMINE. IRIDOSMINE. IRIDOSMINE.

B

156.00
8.31
5.00
3.00
5.00
335.00
4.99
26.00

~~5.45.90~~

50

537.40

538.90
50
537.40

IRIDOSMINE.

IRIDOSMINE.

IRIDOSMINE.

IRIDOSMINE.

Index to Books, by predominating subjects, most of them however contain more or less miscellaneous matter.

in use April 10. 80

Batchelor Carbonization No. 57. 52. ✓

Herring Lamp record .. 73. 67. 74. 78. 84. ✓

Hammer Pump record 19 ✓

Upton Photometric & Calorimeter tests & apparatus. No. 63, & Miscellaneous, ✓

Upton Dynamo Machines etc 63. 8. 77. 82. ✓

Glass Blowers No. 68. ✓

Lawson Meter Experiments No. 25 ✓

Upton Data & Estimates No. 59 ✓

Clarke Fixt Balance & Notes on Short Telephone 72 ✓

Clarke Tables & calculations 58. 66. ✓

Clarke Loop dimensions 66 ✓

Batchelor Coating wires 52. ✓

Telephone chemical. No. 80. 86. 64 ✓

4

Commutator — Book 80. diag. Inst. [illegible] 80

Clamps 70

Ore & Alloys 40

Thermo 21

Lawson Carbonization 32 ✓

Bulbs 32

Chemical Exp 32

Sulphides 27

Spirals & Pumps 85

Sunday Mch 14-1880 5

On Wednesday night and during the day on Thursday of last week (Mch 10 & 11) Professors Barker, Brackett, and Rowland were here, taking measurements of the candle power of the Electric Lamp and of the number per horse power, finding (I believe) very nearly twelve per horse power of sixteen candle power each, considered by them a very favorable result, Intending I believe to return some future day to test the energy of the generators and of the horse power expended upon the machines. After which a full record of their tests and measurements will be published, whether favorable or otherwise.

The measurement of the energy expended in the lamp was made by first weighing the lamp, next submerging

it in water, taking the temperature, Then putting on the current and noting at diferent periods the increase of temperature, for the space of five and in some cases Ten minutes, turning off the current and accurately weighing the water, and from this data and these figures form the basis of Their calculation of the number of lamps per horse power.

During the past week John Ott has been at work on a new Relay, with electric motive power of diferent form and pattern than the electric engine or motive power previously applied to the relay and telephone, M.P. Adams at work on quite similar but diferent electric motive power or engine for chalk telephone. Livingston at work on Hot air engine experiment. Dean on mould for pressing Black Lead or Plumbago into carbon size and form, an instrument requiring

exceedingly neat, careful, and exact workmanship. Some others of the men have been and are still at work on the Large generator and today have one of the magnets wound.

I judge some important business was being transacted yesterday Mch. 13. from The fact of many telegrams being recd. and sent presumably in relation to Edison's relay,

Today his Uncle from   is here visiting him, otherwise the day is quiet and disagreeable.

Sam. Mott stricken off the Pay Roll last night, also Beath.

8 Monday Mch 15-

Andrews' Telephone chalk motor N.G. good power but too noisy-

Hot air Eng Experiment tried tonight but found N.G. in its present form further experiments to be made.

Stamp mould for Plumbago burner finished and tried, found quite satisfactory but needs some little addition which is being made by Dean, tonight

New motor relay finished by Ott this evening but not tested up to ten o'clock. Motor runs very quietly but with low speed and power. it was discovered that by connecting the poles of the Magnets with a mass of iron or steel, that the speed was greatly increased but no increase of power- rather out of the ordinary and usual law of speed & power-

Geo Carman plating ends of carbon horse shoes with nickel, copper & silver; finds nickel to require a much stronger current than other metals.

9

[redacted] (Note book 56 pg. 240)
5-55-Swes .014 & paper .001
[redacted]

Book 41 pg 17 [illegible]

Tuesday [illegible] March

[illegible] all day [illegible] in [illegible] to get the [illegible] Experimental [illegible] to [illegible]

New [illegible] up [illegible] on [illegible] but have not [illegible] it has been tried in a [illegible] way.

Mr. Batchelor [illegible] in [illegible] and finishing lamps with plumbago [illegible], but got only [illegible] any [illegible] are still has that [illegible] will be [illegible] of large [illegible] today [illegible] at work on [illegible]. Are running all evening on [illegible] armature of the [illegible] from [illegible] of the [illegible] have been [illegible] for Photometer [illegible] measurements and tests and have it ready to-night. [illegible] at work on Photometer [illegible].

Mr. Upton is making this evening a Calorimeter test, having got apparatus and implements for the purpose — but it is quite impossible that [illegible] be able to get from him the results, as to [illegible] whether the results will differ from those obtained by Professor Barker Brackett and Rowland.

[illegible] of no other experiments or tests of interest having been made to-day.

Wednesday March 17th

Can get no information from Mr. Upton in regard to his last night's tests and measurements which he is continuing to night.

Mr. Batchelor still at work at pressing Plumbago I suggested to him the prolonging and pressing of carbonized paper or card board but am informed that it cannot be pressed sufficiently to be stable; should like to see carbonized card board prolonged and mixed with Plumbago tried in the press and if of sufficient strength and tenacity I am of opinion it would make a fair carbon as it is reasonable to suppose the resistance would be sufficiently high.

Hussey and Lawson continue the experiments on the steam engine and have as I am informed

succeeded in getting from it forty ~~eight~~ one revolutions per minute quite encouraging in comparison to their first efforts.

The generator with thin (tin) discs finished and ready for the belt but not tested because of insufficient lamps to try its power.

Mr. Clarke diligently at work figuring out the illuminating power of the edge of carbon horse shoes see Note Book No. 66. pg. 223

Mr. Edison (Uncle) left here today for Philada. on his way home.

Thursday March 18.

Mr. Batchelor is this evening pressing Plumbago in thin sheets between tissue paper and then cutting out in horse shoe form and carbonizing have none out yet (10 P.M.)

All work on Hot air Engine ceased last night in consequence of Livingston having cut his hand and not on duty today.

Mr. Upton at work on calorimeter measurements, but does not consider the system of so much accuracy as was attributed to it by Professor Rowland as the original temperature of the water as compared to the surrounding atmosphere has a great effect on the results obtained cold water being brought to the temperature of the air more quickly and easily than it can be carried above.

Mr Greene, President of Western Union Telegraph Company ~~and~~ & President of Edison Electric Light Co. have spent this afternoon here.

Friday March 19.

Mr. Edison left for New York on 11 20 train to return tonight.
All Things very quiet about the Laboratory. Professors Brackett & Young with assistant Magee(?) of Princeton came on 11 20 train. Made measurements of candle power, tested electrometers for accuracy and amount of copper deposited in one half hour burning. calculated horse power expended on generator, and the energy of machine. Up to present the only results I have been able to ascertain are that the armature gave but 14/100 or about one seventh of an ohm resistance and the magnets 1 or 2 ohms resistance.

Their tests and measurements were conducted with great care, and their aim appearing to be, minute accuracy. At their own suggestion their report will be sent to Mr. Edison to use as he may desire.

Thomas Alasher

E C Eugene

Saturday_ March 20

Dean at work on new mould for pressing and moulding Plumbago on ends of fibres. Clark has for a day or so past devising an apparatus for measuring the cross sections of fibre, by suggestion of Mr. Edison. is also devising a balance to weigh carbon loops
see Note Book No. 72 pg 242 &c
which will necessarily be an exceedingly delicate aparatus- inasmuch as a scale used in the laboratory and weighing to one half a milligram is not deemed nearly delicate enough. Three or four Lamps were sent to day by express to Prof Barker of Penn-University.

Several Newspaper Men, (Two- a Suns & a Tribune man) have been here this evening.

This might be called an off-day for this place, very few if any

interesting experiments having been tried so far as I have been able to learn. The large generator was run for heat a while tonight but did not sufficiently magnetize before stopping engine to complete the test.

Sunday Mch. 21

Dean continuing work on new moulds, but otherwise nothing doing in Shop or Laboratory.
To night is the first Sunday night since I have been here and I believe for months before I came, that the Engine has not been running and work in Laboratory proceeding the same as at other times, and it is now understood that night work for the present shall be discontinued. Mr. Batchelor's complaining of his eyes is the present inducement for making this change, which will undoubtedly prove advantageous to all who have from choice or necessity worked nights and slept and rested during the day - and a saving of considerable expense in night meals which have heretofore

cost from $120 to $140 per month during the winter.

Monday Mch 22.

Dean finished mould for Clamps ends for fibre and this evening Mr. Batchelor made two unsuccessful attempts to get the fibres out in tact. The mould however done its work very nicely and he will probably be able to get out some during tomorrow. Mr Edison sketched another design for mold for same purpose and gave to Dean to make.

Have been running large armature all day for heat test find it heats some but could not learn from Mr. Upton the number of degrees increase, not so much however I believe but what it will be able to stand. and

Reported here that on Friday last Mr. Edison in New York City disposed of his relay to Western Union Tel. Co. for 5.0000.

Profs. Upton & Jehl at work on Photometric and Calorimeter tests probably for their own edification and practice as it is entirely useless for to make any enquiries of them in regard to their investigations.

Prof. Barker here a short time in afternoon.

Wilber here and said that during last week he filed for Mr. Edison six applications for Patent (one a day). I copied applications for two weeks stay in Interference cases Edison vs Dolbear & Edison vs Dolbear vs

Tuesday Mch 23.

Clark has Alt at work on his apparatus for measuring fibres. Mr. Edison has Carman Crosby and Hipple at work on experiment of communicating sound ~~and~~ through small lead pipe ~~leading~~ one eighth inch diameter inside leading from Laboratory to Office have not yet obtained desirable results.

Quite a large party of Navy Officers (Swedes) here this evening and apparently well pleased with the lights, sights, and the courtesies shown them by Mr. Edison,

I learn from Mr Kruesi to day

that the large generator (without armature) weighs two tons and has to day been moved into the new "Station"

To days Sun gives the particulars of the sale of Edisons Motograph to the Western Union Telegraph Company.

Mr. Wilber here this evening, he and Mr. Edison at work up stairs.

Wednesday Mch 24. 80

Geo. Carman continuing experiments on lead pipe and having attached a Mica diaphragm at this end connected to battery of telephone by wire, and also connected to relay and sounder, could work them quite well from other end of pipe, in further end of Laboratory, by connecting to that end of the pipe a rubber ball and by slightly compressing it forced air sufficient to act upon the mica disc, breaking and completing the electric connection. and thereby working the relay and sounder.

Dean finished and is using tonight a tool with which he turns a bast fibre down to $\frac{15}{1000}$ and drills

therein a hole of $\frac{5}{1000}$ diameter hole drilled lengthwise of fibre an exceedingly neat and exact tool and doing remarkably fine work.

Ott at work on balance devised by Clark and himself. And Clark has finished weights for same of exceedingly fine platinum wire the least being tenth of a Milligramme

He and another exploder fuse today and were examining under Microscope some waste or dump of gold mine on which Mr Edison had tested his Ore Milling process. and which showed plenty gold and platinum, although none could be discovered even by use of the microscope, before the process was used.

Upton and Jehl operating on an

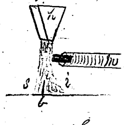
ice calorimeter this afternoon and evening - that's all -

Mr. Goren in behalf of Mr. Henderson here this afternoon in relation to lamps and sockets for lamps for vessel of Oregon Steam Ship Navigation Co. and it was finally arranged to have the sockets made here (or furnished by Mr. Edison) the boys at work tonight cutting card board paper for carbons of lamps for the vessel -

Thursday March 25

Mr. Edison experimenting on magnetic arrangement for separating iron or other magnetically influenced mineral from sand or other finely divided matter. A magnet is so arranged that the sand passes sufficiently near for the magnet to influence the iron from its course and separate from the silica — A bin is arranged with a long narrow aperature in the bottom through which the sand passes in a steady broad, thin stream. A short distance below is set a magnet whose ends come sufficiently near the stream of sand and attract it from the grain current, thus forming two streams to act upon the iron therein but not near enough to allow the metal

to attach itself to the magnet. ~~[illegible]~~ board or other dividing petition is provided and placed so as to allow the influenced metal to pass and lodge on one side of the magnet while the uninfluenced sand will continue to fall perpendicularly and lodge on other side of petition.



h represents hopper m Magnet s silica or matter uninfluenced by magnetism i iron or other metal and "b" the petition board. The tests made with it to day would show probably ninety per cent ~~(absolute)~~ separation

Dean turned bast fibre down to $\frac{15}{1000}$ & $\frac{1}{32}$ long and drilled $\frac{5}{100}$ hole through center lengthwise. Mr. Batchelor inserted manilla fibres through them and had the whole carbonized and got them out

ready for lamps in perfect order and naturally feels quite proud of the achievement

Clark and Garron been for a day or two experimenting on sensative wash for paper for photographing tables. tracings &c.

Paper accounts of Lecture of Prof. Barker on Edison Elec Light (see Friday - 26 - page 36)

Have continued experiments on separating iron sand in manner described yesterday and by having the sand pass through a vessel of water thus retarding the fall and giving the magnet more time to act upon the iron and draw it from the perpendicular decent. have also rigged this evening an apparatus to experiment on dividing the sand by air blast (or winnowing) using therefore a forked glass tube having the sand pass down through one branch at same time air is being forced through the other branch, both passing out of a common mouth, the iron and heavier parts falling and lodging nearest the mouth. The boys are instructed to experiment with magnet in connection with

the winnowing apparatus
The Papers of yesterday contain accounts of Professor Barker's lecture on Edison's Light, delivered Mch. 24. in the Chapel of the Pennsylvania University and which gives to the light really more than has ever been publicly claimed for it by Menlo Park. They also contain Sawyer's general declaration that none of the statements are true that Barker is mistaken or wilfully misrepresenting and that Edison knows nothing.
Find day working to reduce the Pay Roll about $50 in addition to the saving of $30 per week for night meals

Saturday Mch 27.
Nothing new or of especial note or interest doing that I could hear of up to three o'clock when I took train for home, where I remained until Monday night returning at Midnight.
Sunday and Monday – absent

Experimenting on various forms of clamps and connections for fibre carbons trying Oak and various other woods for the carbon ends Mr. Edison this evening reducing tissue paper to a pulp to test for carbons but appears to have but little faith. a Jansen suggestion imported by Mr. Upton,

Boehm preparing an apparatus for carbonizing by electricity in a vacuum,

M. C. Lavan and P. Campbell of Sanfrancisco here today - had with them some samples of Gold ore from which Mr. Edison abtained $130 worth of gold - as I am informed by "Basic"

Got for Dean, the smallest die that could be found for cutting thread on screw but on trying it he finds it only about one half small enough in other words he will undertake to make one a trifle over one half the diameter or about 10 one thousandths - he is turning Oak down to $\frac{12}{100}$ and drilling therein lengthwise a $\frac{10}{100}$ hole - for use on ends of manilla fibre carbons -

Messrs Upton and Edison trying by use of friction dynamometer to ascertain the horsepower being exerted on generator, but I could not learn the result -

Wednesday March 31-

Mr. Serrell here looking up papers and getting evidence ready for telephone interference Edison vs Stroh- Ott making further experiments on telephonic motor.

Dean at work on metallic parts of apparatus for carbonizing in vacuo by electricity-

Experimenting tonight on drying sand by centrifugal machine driven by electricity, took sewing machine motor from Office for the purpose find the sand to dry very quickly and rendered fit to sieve in a few minutes (say 10)

Quite a number of Mining men here today one bringing black sand tailings from Brazil but the Dr

could find no gold same man brought some substance resembling rotten stone which could be ignited with match and burn for some time emitting a smell similar to the smell of burning animal oil. also said to produce gas in large quantities.

Thursday April 1

Ott still at work on Telephonic motor experiment. Hipple and Crosby on centrifugal apparatus.
Mr. Edison tonight commenced experiment on pumps with the view of using single instead of double pump as at present also of combining or arranging a large number in small space. has on two lamps of fiber carbon. globes made tube shape

Friday April 2. 80

Mr. Edison still on pumps, boys on centrifugal dryer,
Ordered rails for electric railway - sufficient to lay track ½ mile long -
Dean and Boehm finished their work on apparatus for carbonizing in vacuum. The glass pump part up this evening but no connections made.

Saturday Apr. 3.

Professors Young & Brackett here making tests of the generators. and have spent the greater part of the day on them.

Mr Edison has been overhauling the old books and papers for matters in relation to telephone

Mr. Batchelor has been pulping paper by steam and subjecting it to immense pressure. do not know the intention.

I copied Preliminary Statement of T.A.E. in Interference T.A.E. vs Anders & Dolbear. Mr. Willis came in evening and took Statement with him to Washington

Find that the pressed pulp is intended for clamps or contacts for the carbons

with the conducting wires.

Sunday April. 4.

Find on my desk this morning for copying, a letter to Nixon Green in relation to Patents on relays. also Patent for Separating Magnetic substances from non magnetic substantially as described herein on March 26. Patent Numbered (application) 216.

Letter to Mr. Green refers to Patentable forms of relays which in part or in toto avoid the Page Patent and is intended to be accompanied by 16 different sketches of the manner it is accomplished by Mr. Edison's inventions

This afternoon and evening Mr. E. and Batchelor are experimenting on the method of carbonizing in vacuum but the efforts so far

have been discouraging all the carbons or attempts at carbonization, having oxidized, a regular mercury air pump has been prepared and set up and a globe shape glass vessel fitted air tight on pump, when vacuum is obtained the electrical current is completed through the mercury which is caused to ascend a double tube and form contact with iron wires, attached to the device for holding the paper or fiber encased in the globe, extending down the tubes, or double tube, The whole apparatus neat and complete but a perfect and absolute failure as a carbonizer, (Note book No. 51. pgs. 1 &c.

Wm Holzer and Lawson experimenting on glass with acids, giving it the appearance of ground glass. Holzer instructed to experiment on the inner small globe with different ways of treating, with a view of preventing cracking of that[illegible]

Mr. E. (now suggests c'ing under pressure and notes for same in Book No. 57 pg 23 Pm.)

Monday April 5

Mr. Serrell here and taking testimony in interference case (Short) part of which I coppied and gave to Mr. Griffin.

Mr. Wilber here in evening and took papers which I coppied on Sunday but was unable to get Griffins signature tait evening. took letter book copy of Patent in Book for that purpose commencing on Page 1st & of letter to Green on last page of same book.

John Ott finished a new receiver and motor connected therewith but does not think it a success, himself. the chalk being directly on shaft of revolving armature, revolves too rapidly, and not running as

quietly as those previously made.

Moffit finished a more complete apparatus for experimenting on magnetic substances, one for dry, placed up stairs in Laboratory & one for wet, and to be used in connection with water pipes. put up on outside of Laboratory near side door.

Kinney and Mack Force have got the use of the Western U. Tel. wires to and back from N.Y. City & Philada. and are testing the autographic over fifty (50 from N.Y.) and one hundred and twenty (60 from Philada) miles of wire. and have had fair results. later in evening got very good results through the New York wire.

Tuesday April 6.

Some parties from the American Machinist here today indicating the horse power of the engine expended on the machinery and generator and the horse power expended on the generator alone.

One of the generators moved into the Laboratory for use, I believe, as a motor for driving pump for hydraulic press.

Geo. Carman & McLaughlin passed here at about 9.20 this evening for California

Sam. Mott set at work on drawing of very thin wood (or veneering) to be cut in narrow strips, bent in horse shoe or other shapes for carbonizing. for use in Lamps, do not know whether the experiment has yet been tried see Note book. 57 pages 27 &c.

I copied for Mr. Batchelor the statement of result ~~to~~ ~~has~~ Mr Clark has obtained in his experiments on the carbons in telephones, an interesting and quite ~~interesting~~ lengthy paper. see Note book No. 72 pg 238.

I had some words with Mr. Carman and was by him informed that I might consider myself discharged, but replied that Mr. Edison was my employer and that I looked to him alone for such action and continued at work all day, amongst other things balancing the books.

Wednesday April 7. 80

Mr. Serrell & Edison overhauling all old telephone papers and assorting and classifying them for use in interference cases.

Mr. Batchelor having John Ott make apparatus for working wood down to proper thickness and for cutting strips therefrom to be carbonized for burners. after ten oclock in evening cut some off very neatly and believe they have struck a good thing. It yet remains to be seen what sort of carbon the products will make. Book 57 pg 31 &c.

Mr Kinney and Force jubilant over the belief that they had obtained excellent results on autographic to Phila. and return, but Mr. Edison informed them that in reality they were working only from one instrument to the other a distance of not over three feet, and

after some difficulty in making them understand why that was the case, and directing them to place a ground wire between the machines they could get nothing readable

The boys tonight testing their strength and bottom on generator in Laboratory. and Mr. E. stands at head on 143 volts. The least of them however were able to produce a fair light on lamp attached to the wires from the man impelled generator. Note Book No. 82 pg 83 &c.

Thursday April. 8. 1880

Those at work on the lamp and on carbons (Batchelor Force. Mr Edison Flammer and some of the men in Shop) greatly interested in the efforts to devise suitable means and devices for reducing woods to sufficiently small dimensions for carbonizing, and have been trying several different devices. Ott being of opinion that a very fine keen saw will leave the wood smoother and in better shape for the carbons. Had some carbonized late in the evening but they did not turn out entirely satisfactory being some-what mishapen.

Mfg of Loops & Rings of wood Note B 51 pg 35, 41 &c.

Crosby and Hipple making some crude experiments on sand blast, using steam, and considering the inappropriate apparatus (simply sand lain on a board and forced by steam against the glass) they got very good results,

Mr. Edison, Upton & Frances making comparative tests using Edisons Dynamometer and calarimeter,

Mr. Holzer made new style of glass cup for filling pump joints with mercury

Friday April 9.

Still carrying on their wooden experiments on various kinds of wood and have had Martin Force out gathering what natives he could find.

Mr. Honig at work on diagram of break and starter for the Electric tramway. Book 62 page 103

Clarke calculating the size of wire necessary for running about the Park to the Lamps and old factory (see Note book No. 66 pages 64. 68 & 70 &c) &

Lawson experimenting on extracting the gum and resinous elements from different woods to prepare them for carbonization. Put them in alcohol at two oclock P.M. Book 32, pg 109

He and Hammer also experimenting on cleaning mercury. get best results with sulphuric acid and Ferric chloride of Iron.

Blue gravel Dry Creek tunnel, Yellow gravel Dry Creek tunnel, Davis Gravel Thompson flats, Chamberlain Gravel Thompson flats, Dry Creek tailings bottom dry creek tunnel, Put in bottles in water and labelled.

Boehm made glass cyphon for experiment on the new single Sprengle principle pump. see Note Book No 68, page 7. and sketch dated ~~Mch~~ April 4. 1880.

Andrews at work on apparatus for holding spirit lamps sort of a stand. does not know the use they are to be put to.

Mr Serrell here classifying evidence for telephone interference cases

Saturday April 10.

Heating soap stone furnace devised by Holzer and Moses being tried and tested by Mr Holzer and found to work admirably both standing and retaining the heat exceedingly well.

Several of the men at work, dressing & putting down sleepers for rails of electric tramway, Vorhes preparing copper connections for joints of rails, and efforts being made generally to push the road to completion as soon as possible.

Wood Loops. Dean making tools for stripping wood for loops and dividing and making attachments for lathes for doing the work.

Carbonization. twelve moulds of several different kinds of wood carbonized

this A.M. and came out good carbon but somewhat misshapen. Gum and Holley coming out in best shape and most perfectly. The Resistance varied from 130 ohms (the lowest) to 180 (the highest) Note Book No 57 page 103 &c.

Pump. Dr Moses trying the new Sprengle drop pump with syphon attachment, as a whole finds it does not give results entirely satisfactory. Mr. Edison with much reason attributes the partial failure to the syphon attachment rather than to the pump itself.

Annealing oven. Andrews at work on an ~~oven~~ spirit lamp oven for annealing glass. devised by Holzer.

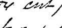
Sunday April 11. 80

Electric tramway. The track crew of the section of the Penn. R.R. are laying sleepers and spiking rails on the electric road and work on it being pushed as rapidly as possible in all ten men are on the work today.

Wood loop white Holly first put in lamp about 5 o'clock this P.M. put on pump and heated up at sie. one having a bad spot broke at that point before sealing off. the other remaining on all night

Monday April 12. 1880

Pump, it was noticed that in pouring the mercury in the globe reservoir, that the force carried more or less air into the globe from whence it found its way into the cyphon and thence to the pump to obviate which Dr Moses had tubes made closed on bottom with apertures on sides near the bottom so as to break the fall of the mercury and distribute it in the bottom of the reservoir with less force, found it to remove the dificulty of air in the cyphon but still the pump did not work as completely as desired.

Holders, the first armature with the new style of commutator brush holders finished and put in this A.M. by new style is meant  an arm attached on part of box cut for that purpose and secured from turning

Monday April 12

by a set-screw. And upon same generator was put the first ~~plate~~ inscribed "Edison Electric Light Co." New York. At just 12 o'clock at night and the machine completed entirely.

Lamp. Lawson and Holzer treated thirteen Lamps by their process (~~for grinding the glass of the lamps~~). The acid acts upon the surface of the glass rendering it opaque like ground glass the action was very uniform and and greatly mellows the light given out by the lamp.

Enealing oven, composed of a round base arranged to hold lamps close together an upright rod, a movable hub on same with arms of wire extending horizontally with ring on ends sufficiently large to admit the small end bulb of inner tube to pass through

~~[illegible]~~ down to the second bulb which rests in or upon the ring. with another ~~lighter~~ wire extending from the larger arm above it with spring holding device, to hold the thinner or long end of the tube from toppling about. the whole is then enclosed in a metalic sheet about ten inches in hight.

Wood ~~[illegible]~~ Holly lamp still on pump tonight and giving off considerable air every time it is heated up.

Wood loop Dean at work yet at twelve o'clock making tools for getting out the wood loop in the desired shape (U shaped) and to obviate the necessity of steaming and bending.

Flammer and Force making a device for steaming and bending, by means of a weight, at same time.

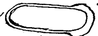
Mr. Upton making double calorimeter tests of generator. passing the current through

calorimeters one with about 189 and the other 280 lbs of water. the first test that has been made in that manner. Book 82 pg. 137

Automatic, Force and Kinney are brought using the W.U. wires for experiments and tests of the Automatic telegraph through New York and get very good results

April 13. 1880

Pump. Boehm making drop pump after sketch and plan of Mr. Upton. Note Book No. 63. pg 98.

Wood milling. Dean finished and is using the Lathe attachment for cutting wood out in required shape whereby the steaming and bending is dispensed with, he uses a steel former  Oval shaped in which travels, the end of a solid steel rod and guides the revolving ~~cutting~~ cutting knife ~~the~~ to cut just the form and required thickness without danger of cutting where not desired. Book 57. page 55

Pyrites. Lawson commenced a series of experiments with the view of obtaining gold and other metals from Pyrites tailings

Motor. The generator set up in the Laboratory was run as a motor and tested with Prony dynamometer, which showed power of 68.100 ft pounds Book No. 59

Calorimeter. double calorimeter test very carefully made Howell and Mott assisting Mr. Upton. Book No 82. pg 161.

Copper conductor. Clarke's calculation of the size and weight of conductors necessary to supply electric current to the lamps being put out about the park and to the old factory for motor purposes, finished and as one of the results he finds that 6.3 tons of conductors will be necessary Map and results given to Mr. Kruesi. Note Books No 66. pgs 64.68.70 &c. & 82. pg 105

Length total 27,600 ft – Kruesi
Book 56 page 54 &c.

Magnetic Separator. Crosby & Hipple reversed the magnets for or rather turned them one above the other for separating

Magnetic from Non magnetic material and got excellent results, much better than they got with the magnets side by side.

Encaling oven Holzer trying encaling oven and seems satisfied with its working entirely successfully.

Wood carbon white holly still on pump giving an excellent light.

April 14

Interference Mr. Edison and Batchelor with several of the boys hunting up from amongst the archives, all telephonic apparatus they can find and using such as are appertinant to the Interference case Short & Edison evidence in which is being again taken.

Wood carbon lamp of white holly broke in glass on the pump about eleven oclock this A.M.

Wood loop of proper shape gotten off the machine to day, quite a number having been cut by Wm Wright. The machine was then stopped to arrange it to run 7000 revolutions per minute. and Dean making new cutter for it.

Steam Ship of Oregon Steam Navigation co. it is learned by letter will leave Chester for New York on the 17th April And work on the generators in Shop is being pushed to have them ready for use therein.

Wire armature machine in Laboratory run as motor, and ~~made~~ its own momentum carried it 148 revolutions after armature was opened. 243 Rev. field off and armature opened, 161 field on brushes off. Machine now in use .037 plate made under same trials 336 Rev. field off brushes and armature on, 295 Rev field and brushes on. 277 & 269. field and brushes on,

Thin disc new machine with field weak from reversing made 845 Rev. after bringing up field, 476 & 465. with field and armature off. 759 Revolutions.

Pump. Dr. Moses took down the syphon pump and had air trap attached and made exceedingly like the regular Sprengle.

April 15-80

Hydraulic Pump delivered on stoop of Laboratory this morning-

Tests of the current of main wires in Laboratory made by Mr. Upton this morning. with meter and Electric Dynamometer. Book 82. page 175 &c.

Also tested wire generator in Laboratory as motor with wooden Prony Dynamometer. Book 59- page 207 and Book 82 page 185.

Boehm at work on new pump sketched on page 25- Book 68.

Short evidence being continued all day-

Magnetic separator. Crosby and Hipple experimenting on ~~sand~~ magnetic separator trying as many as five magnets arranged one above the other find two magnets to give practically as good results as have been yet obtained. through hopper now in use they run 25 lbs per minute. and separate it very completely

New form for cutting card board loops made somewhat wider at ends & heel finished and in use to day by Van Cleve. from which he carbonized thirty-nine carbons

Loop cutter sketched and described by Mr. Batchelor in Book No. 57 page 75- directed to be made by Dean.

Frictional resistance of Belts and pulleys of Edison Dynamometer as now in use in Generator room requested by Mr. Edison to be calculated by Mr. Clarke Book No 72 page 68 &c.

Brackett & Young report on comparison between Prony and Edison Dynamometers & Efficiency of Faradaic Machine, being carefully revised and corrected by Clarke first test of 10 minutes. Prony Registered 612 460 ft lbs Edison 547 666 ft lbs- by Brackett's reading 690 880 ft lbs. in this last ~~reading~~ reading Prony registered 88.6 per cent of work registered by Edison Dynamometer which was driving it.

Second comparison. 4 minute test. Prony registered 310.680 ft lbs and Edison regst. 333 360 ft. lbs. Prony indicates 93.2 per cent of work indicated by Edison

Faradic test 13m 50sec Mean Dynamometer gave 994.6 Mean speed of main shaft 172 Rev. Energy expended on driving armature 2839550 ft. lbs. and on field of force 19634 ft lbs. Total energy realized 2416147. Available 2234845 Total efficiency 84.5 per cent available 78.2 per cent

second test of Generator 9 minutes gave same per ct. of efficiency.

Street lamps nine hogsheads of large Globes for Street lamps were received to day.

Unbent loop. Three moulds of natural cut loops carbonized today

Second generator for Columbia finished up and running to night.

Friday April 16

Carbons Three moulds of natural cut loops taken out and Thirty card board horse shoe cut by new form broader at heel, taken out this A.M. Book 57 page 115.

New Receiver the late form [illegible] by Ott had new chalk put in it this A.M.

Sluice box sketched and Hipple and Crosby requested to build it. to be experimented on in connection with the magnetic separator

Pump experiments. Upton and Jehl put up induction coil and condenser in dark room to be used in connection with experiments on pumps now being conducted by them. Dr. Moses continuing pump experiments up stairs

using scales for weighing mercury and battery and alarm in connection therewith.

Electric tramway men at work on the trussling and Kruesi. Honig & Ott devising lever attachment to reverse the magnets and brushes and control the movements of the car motor.

Armature of .037 disc or plate that has been in use for some time, was taken out by Cunningham and found to be considerably out of balance which had undoubtedly been the cause of that machine running with more or less of a thumping jar. and causing considerable more wear in the journals than would result from one perfectly balanced. After balancing and replacing it was found to run smoothly and free of any jar.

Arm and lever attachment sketched and suggested by Mr. Edison last night is being gotten up by Dean. The purpose of which is to act as a guide for cutting the wooden loops
Book No 57 page 71 &c.

Shipped Weston electro dynamo machine to A. Bergmann 100 Wooster St N.Y.

Wood experiment. Martin Force is plaining holly down to .02 in. thick to be cut in loops by same method and form used in cutting card board.

Electric Governor. Ott finished and polished up the electric governor so that at 260 revolutions it acts very promptly and sensatively and they found that at 280 revolutions it exerted a force of ~~five~~ pounds on spring scales. I do not consider the spring balances will properly show the force exerted from the fact that the hook end has to travel through too much space to show small differences on the dial whereas

whereas a scale (platform) would act through but little space and might show quite diferently the pounds of force exerted by the governor.

By dispatch from F. McLaughlin lying on desk date 16 April I see that he says he has shipped tailings from Tyson Goldron.

Short Interference evidence taking continued to day.

April 17

Columbia. Two Faradic Machines complete. Nos. 11 & 12 Shipped to day in care Morgan Iron Works foot 9th St New York for steamer Columbia.

Press. Partition between Old Office and Laboratory part of frame building taken out preparatory to setting up the hydraulic press.

Generator test Mr Upton made a test of the .036 disc generator, with two cells, Daniels & Fullers as field of force, getting 25 volts, Book 82 pg 201 Also tested wooden loop lamp No. 1029 Book No. 82 page 204 &c.

Frictional resistance of belts and pulleys. Mr. Clark finished ~~calc~~ theoretical calculation of the frictional resistance of the belts and pulleys of Edison Dynamometer total frictional resistance

20059 ft. lbs Book No 72 page 68 &c. he is now preparing to make a practical test to demonstrate the accuracy of the theories on which he based his calculations.

Reverse switch. for electrical tramway sketched and plan given to Ott for him to make patterns for castings ~~the instrument~~

Reporters Two french gentlemen said to be reporters here this P.M. and shown through the works by Mr. Upton.

Glass. Man here with samples and extolling the merits of a malleable glass.

Wood horse shoe, Vanfleet cut from the .02 holly wood prepared by Force, a regular horse shoe loop in new frame brought it out entire,

April. 18.

Electric tramway. Three men straightening and grading track. Three laying and spiking rails. and three at work on trussling and other parts of the road. in all nine men on the work.

Pump Francis had Holzer make pump after his design. which is very simple, free of stop cocks. takes but little room, and comparatively little mercury, tried in evening and pump vacuum up to one half of guage tube obtained in a little over an hour. he had also made a rubber stopper cup or socket in which to make the lamp connection without the necessity of using ground glass stoppers.

The regular pump men Beach. Hammer. and Herrig. absent and C.P. Mott running the pumps.

Bracket, designed for Steamer Columbia sketched by Mr. Kruesi is being made by Mr. Andrews. Book 80 pge 176 &c

American Machinist report being revised and corrected by Mr. Clark. Book 72 pg 99 &c

Ore and tailings being crushed and prepared for Mr. Edison & Dr. Hide

April 19.

Wood loops Van Cleve cutting horse shoe loops from .02" holly milled or planed down by Dean put three in form at one time and got out two after carbonization in good shape and appearance.

Mr. Batchelor making careful calculation, and sketch for new wood milling machine and has Dean at work on it.

Pumps. Francis put one wooden loop lamp on his pump in Dark room and got vacuum and heated up in two hours.

Dr. Moses with two paper loop lamps got good vacuum in five hours but had not heated. from these first efforts it would be dificult to say which of the pumps were best ~~for~~ and quickest for getting vacuum. but the pump in use by Francis is

much the simpler, cheaper, and occupies less room. Boehm making a new pump slightly different from either just mentioned sketch Book 68 page 39.

Lamps for Columbia were measured for resistance and photometric value. put into stands and gotten ready for packing. It was noticable, that the loops cut after the new wide heeled form did not generally give as many candles as the old style loops. Bk 82. pge. 209

Lamp plain [illegible] gave 25 c. gave 23 after [illegible] [illegible] gave [illegible]

Columbia. Faradic Machines Nos. 13 & 14. for Steamer Columbia finished up and tested. 13 proving O.K. but No. 14. gave no current and the armature was taken out by Cunningham and found to have a bad cross. which he is at work on remedying.

Meter, Lawson is preparing for a practical test and application of electric meter on the line in Labratory.

Ores and Tailings Mr. Edison and Dr Hyde assisted by Crosby are experimenting and testing ores and tailings, quite a quantity of which have lately been received.

Globe mould. Holzer and Hornig devising and the latter sketching form of mould in which to blow the larger or outer globes for the electric lamps.

Hydraulic press. A man is here cleaning up and putting together the hydraulic press lately received.

217 Columbia: Faradic machines 13 & 14 shipped to Steamer Columbia care Morgan Iron works foot East 9th St. Mr. Upton went to New York this A.M. carrying with him a couple lamps for the steamer[1] to see whether the wires and connections were properly up and made and ready for the reception of lamps &c. on his return he brought one of the large opaque globes in which it is proposed to place the lamps in steamer, The armature of No. 14 weighed 212 pounds.

[1] to test the wires, See Book 82. page 217 and to see whether things were

Electric tramway. Ayers drawing more rails for same, and Moffett & Truman ~~[illegible]~~ work on Station, 14 by 18 feet.

Stay pins are being put in all the Magnets of the Faradic machines by ~~Bradley~~ Logan. The pins are put down

through the thinner inside part of the circle in which the armature revolves

dotted lines represent the stay pins

Cam feed Automatic Machine for cutting wood loops on which Batchelor and Dean have been at work for a day or so, finished and tried but found necessary to make some little alteration in the cams. Mr. Edison made sketch, of the completed machine, which is attached hereto.

Air Blast Find on Mr. Kruesi's desk a sketch by Mr. Edison of the following, all on one sheet, which I dated April 20.80 and signed as witness. Blast for experimenting on separating sand, & Pump or

Pump apparatus for exhausting the air from Carbons. Wood block milled preparatory to sawing or cutting off the loops. And an Apparatus

Arc Lamp. which I judge to be an arc lamp with electric engine attachment for revolving the carbon

which Crosby and Hipple are experimenting on by order of Mr. Edison, obtaining their blast by hydraulic pressure.

Meter test Lawson & Mott run wires from two Daniells cells in Balance room to glass house, thence to engine room thence to room now used for telephones, thence return to Balance room, for meter test purposes, they having placed in the line four Voltameters one in each of the rooms mentioned.

Pump. Dr Moses in his pump experiments has ascertained that it is necessary to pass 250 pounds of Mercury through his pump in order to obtain a pump vacuum.

Flint glass tried by Holzer for the inner lamp tubes it remains to be seen how much the percentage of breakage will be reduced by the use of the flint glass rather than the common glass heretofore used.

92

Car Couplings. Ott making patterns for castings for couplings for cars of electric tramway

American Machinist report. Mr. Clarke finished letter on Article in reply to report made by American Machinist No 72 - page 99 to 137 -

April 21 - 80 93

Armature core. Book No. 79 page 233
Mr. Kruesi has made sketch of armature core for Machines 15 - to No. 21. inclusive, in which he reduces the diameter at the ends of the core where the wires are tied so that after the canvass coverings are put on the diameter will not exceed the central diameter of the armature

Opaque lamps. Photometric test of acid treated lamps made, results in one case face. 9½ candles side or edge 5½ candles - in another, face 17 candles & edge 9½ candles, Thus edge giving 56% of face. This shows a less difference between face and edge than is usually obtained from the clear or plain glass lamps
Book No. 82 page 215

Street Lamps. with plough and shovels the ditches, for conductors to the Park. Street Lamps were commenced to day; first passing through a couple times with plough and then cleaning them out by hand.

Meter. The electric meter placed by Lawson in the Balance room was found to have disconnected by the copper strip leading from the wire to the sheet, having eaten off at the surface of the liquid solution.

Pump consisting of but one tube intended to answer the double purpose of the Sprengle drop and guage, is being made by Boehm after sketch in Book No 68 page 45

Safety Clutch. Mr. Upton is experimenting on lead wire for use as safety clutches on Steamer Columbia also on neat and convenient holder or concealer for the same.

Yesterday and to day Mr. Clarke has been in Newark collecting data on Steam and engines and examining into the merits of quick motion engines.

Chloroform Mr. Edison states as a fact much to the surprise of. Messrs Clarke Upton and others, that Chloroform would not burn but on the contrary would extinguish fire.

Wilber here during the afternoon.

April 22

Flint glass. On April 20 Holzer sealed platinum iridium wires in inner tubes of flint glass, ten in number, which were examined to day by Flammer and pronounced entirely free of cracks, and the best glass yet used for that purpose.

Small Dynamo. Mr. Kruesi made sketch last evening for dynamo arms to be 18 inches long by 3½ diameter & 5⅛ in armature. patterns for which are being made by Ott.

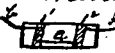
Platina wire lamp made for experiment by request of Mr. Upton. which gave about ⅛ candle power before vacuum on 5 Daniell cells, but was melted down by Mr. Edison on pump before the power in vacuum was tested

Pump. The single tube pump made by Boehm yesterday. was started by Dr. Moses and he has succeeded in getting a good pump vacuum in 17 minutes and the pump appears to work quite satisfactorily. Francis also at work with his pump but so far as known has not timed it or obtained any data as to its merits.

Electric Locomotive. Bradh making Patent office drawings of the various separate parts of electric locomotive and the same as a whole. from sketches by Mr. Hornig.

Motor. The generator previously placed in the Laboratory was run to day as a motor. and found to heat in the journals to a very appreciable extent. I think the test was made to ascertain whether the journal heating was entirely attributable to the machines generating electricity or whether it was partly

due to friction and belt-strain.

Safety clutch. Mr. Upton devised and had Andrews making safety clutch, concealed in box shaped device made of wood, vulcanized paper, or other non-conducting material practically non-combustible or such as would burn only at much higher temperature than that reached by the melting or burning off of the clutch.  Two metalic conducting straps or bands 1.1. pass across the box, with main or leading wires b.b. attached either by screw pressure or soldering thereto, and clutch wire, a. composed of lead or lead and zinc or other conducting metal easily melted, connected to the straps by screw pressure. The whole forming a neat trap. designed for use on the lamps of Steamer Columbia. but applicable wherever a safety clutch is desired.

Blast Pipe Lersby attached a two inch iron pipe to the blast box or trough leading to the furnace. carried same up into second floor of Laboratory. for experiments on sand separation; but so far as tried tonight. did not give good results.

Prof. Rowland's demonstration of the power of the carbon loop of Edison Electric light has been today compared by Mr. Clarke with his method of finding the same. and finds that although their methods and formula differ. they get same results through their different channels. See Book No. 72 pg 188

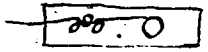
High Speed. Mr. Porter, Manufacturer of high speed engines, of Newark, here this evening. and by demonstrations of his thorough knowledge of the subject, still further confirmed Mr. Edison's belief in high speeds.

Dynamometer. The pressure of steam in the boilers and engine was reduced down to 10 pounds and steam taken in full length of stroke to see what effect it would have on the steadiness of the engine and on the Edison Dynamometer. but the difference if any was not appreciable.

Telephones. Several boxes of telephones packed and shipped to day.

Columbia. Mr. Upton and Cunningham went to New York, carrying with them some of the lamps and lighter parts of generators, to set up the dynamos and fit up the Columbia.

Apparatus for playing out the conductors for Park Street Lamps. composed of three wheels and a reel arranged on plank secured to wheelbarrow, intended to straighten and stretch the wire while being run off.



Telephone Receivers. Andrews fitting up telephone receivers air tight, by putting packing around the chalk arm or cylinder and in other ways, that they may resist the action of the atmosphere, particularly in

hot and dry climates, when the tendency of the chalk is to dry out quickly.

Pump. Boehm made at request of Mr Maw a double tubed pump (one tube within another and larger one) arranged ~~with~~ for lamps on bottom and dryer at top where the lamps are usually placed. Book 68 page 51. He also made according to his own idea a single tube pump quite similar to the one experimented on by Maw Book 68 page 53.

Dynamo. Mr. Kruesi made sketch of Dynamo, Book 56 page 67, arranged for being secured on floor or base with one arm or magnet above the other, parallel therewith. a good device for generator for vessels or cars. or where any jar or unsteadiness might be encountered.

Tramway Station Mr. Honig made design and sketch for dynamo station especially adapted for electrical tramways, and to control the movements of trains &c. from one point. Also sketch and device of Annealing machine for glass house.

Conductor boxes, being treated with a thick coating of gas tar, to enable them better to reject moisture and as a preventative against decay.

April 24

Columbia Upton and Cunningham in New York again on Columbia and got in the evening two of the generators running, but not early enough to test them any more than to connect one lamp to them at the machine.

Pump by Francis again up and running with lamp on, and got vacuum in two hours. He had attached a device for flooding and removing the Mercury from the lamp cup or holder, made with small piece glass tubing attached on side of cup about one third down from top, to which is attached a short piece rubber tubing running and attached to a small reservoir, bottle or other receptacle, by the raising or lowering of which the mercury is forced in or drawn out of the cup. the rubber

cork or stopper in the cup is cut sloping so as to deposit the mercury on the low side at the point of connection between cup and tube.

Hydraulic Press. pump belts were put on Connecting pump with dynamo motor in Laboratory and run it for some time not however doing any work with the pump.

Journal. in which to keep these records and diary received to day and some of the preliminary work done in same

April 24

Columbia Upton and Cunningham in New York again on Columbia And got in the evening two of the generators running, but not earlyr enough to test them any more than to connect one lamp to them at the machine.

Pump by France again up and running with lamp on, and got vacuum in two hours. He had attached a device for flooding and removing the Mercury from the lamp cup or holder, made with small piece glass tubing attached on side of cup about one third down from top, to which is attached a short piece rubber tubing running and attached to a small reservoir, bottle or other receptacle. by the raising or lowering of which the mercury is forced in or drawn out of the cup. the rubber

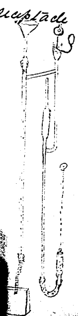
cork or stopper in the cup is cut sloping so as to deposit the mercury on the low side at the point of connection between cup and tube.

Hydraulic Press. pump belts were put on connecting pump with dynamo motor in Laboratory and run it for some time not however doing any work with the pump.

Journal. in which to keep these records and diary received to day and some of the preliminary work done in same.

April 25

Pumps. Holzer made ~~six~~ additional pumps of same pattern as one in use in dark room by Francis with new cup flooding device, and put on frames with long slots in bottom and wooden slide fitted therein moveable up and down and to which is attached the tube receptacle of the guage mercury.



April 26

Absentees. Mr. Edison and Clarke in Newark in fulfilment of appointment made with Mr. Porter on April 22d.

Kruesi, Upton, Force & Cunningham in New York on the Columbia and tried the generators and lamps, by loosing control of the engine the armatures were run at a very high speed, judged to be 1600 or 1700 Rev. per minute, and one of the armatures was damaged by a cross so that they brought it with them in evening to have it overhauled and fixed. they also brought some of the lamps which were both too low and to high resistance.

Annealing machine devised by Hornig is to day being made Andrus.

Pump Boehm started pump in Glass house and obtained vacuum in very short time, with no lamps on.

(Insert. Autographic from pg. 115 - date 28.)

Water Pipe leading from Pond had become so filled up and dirty that Mr. Hood attached water pipes and is forcing water back through it carrying out quantities of mud & dirt.

Cleaning Mercury Dr. Moses is experimenting on some mercury that by accident had got fouled with zinc. he had made by Boehm a reservoir in which he put the mercury and covered it with water. and by an attachment on principle of Sprengler pump worked however by water. he kept the mercury agitated by the air seeking its way through it to supply the place of that taken out by the pump. he afterwards heated it and evaporated the water, then kept it agitated by shaking after which it was treated with

acids, he had not finished the cleansing up to evening but had the mercury in much better condition than before.

Hydraulic Press. Pipe connections of Pump and Hydraulic Press completed and Pump working by Dynamo. electric Motor in Laboratory. with good field on she pumped against a pressure of 1000 as indicated by the Hydraulic pressure guage. being, I believe, all the pressure required of the air chamber, and all the power required of the pump motor.

Columbia. Upton Force and Cunningham still at work on Columbia. during the afternoon and evening a reception is being given on board of her and all the people here who were fortunate enough to receive invitation cards are down. Mr & Mrs Edison going down on 6:30 a.m. train

Armature. The first one wound by Lewis Tweed was finished by him today. he also renewed the injured wire of the one crossed at the Columbia. One of the armatures finished some time since but not used. had to have some overhauling by Andrews in consequence of shrinkage and whapping of the Vulcanized fibre.

Ores from High Mountain Lode sent by J. Brother are being tested by Dr. Haid.

Locomotive Magnets - the magnets for electric tramway engine wound with ten layers of .049 covered copper wire. and put together - one above the other.

track for electric tramway finished to and around the first bend at first trussel work.

Pump. Francis claims good pump vacuum on his pumps, in six minutes.

April 28. 1880

Locomotive. Magnets of Locomotive for electric tramway wound with ten layers of .049 wire, were charged and their strength tried. The poles at the base were connected by a block of iron such as used on top of generators and adhered to the magnets so tenaciously that it required the full power of Mr. Kruesi to separate one end of the block from the magnet by the use of a short purchase bar, a force calculated by Mr. Honig to be equal to 6400 pounds.

Hydraulic Press. The electric motor worked the pump of hydraulic press against pressure gauge of 1500. paper was tried between the steel dies previously used on press up stairs and by a pressure, ~~of~~ indicated by Press gauge, of 4 tons. reduced paper from

.009 to .004 and compressed the paper in the steel. A piece of white Holy one inch thick by 3 inches square and by an indicated pressure of 2½ tons was reduced to 5/16 in in thickness and almost as solid and hard as bone.

Frictional resistance. In furtherance of Mr. Edison's desire to learn the actual frictional loss in belts and pulleys, journals &c. Mr. Clarke is having made a calorimeter to measure the energy lost in journals of the armatures.

Lamp protectors. Several of the lamps on the Columbia having been broken by jars from pounding overhead. John Ott to day made three spiral springs by which lamp stand may be attached to sealing or any structure overhead and it

was found that severe pounding would not jar the lamp sufficiently to break the carbon.

Autographic. Last Monday Night Mr. Kinney got the New York and Philada wires connected so as to have the full circuit of about 175 Miles and got very good and encouraging results on the Autographic.

Conductor boxes. The wooden boxes in which to run the conductors to the Street lamps &c. are being laid down.

April 29.

Wood loop. cut from the thin walled Holly milled by Force and cut after manner and in same former used for card board, carbonized by Van Cleve were measured and put in Lamps ready for pump resistance 125 and 194 ohms.

Pump. Mr. Upton finds the larger tubed pump in use in dark room to run from 12 to 13 lbs of Mercury per minute. and comparing the small gauge used thereon with those used on pumps up stairs finds them to compare very favorably and equally sensitive ~~with~~ to them.
Dr. Moses put up a double Sprengler or combination pump, but has not yet gave it a very thorough test.

Hammer attached four lamps to one pump and noted the time required to seal off and was ready to do so in five hours. a very good showing inasmuch as it frequently takes that time to get vacuum on two lamps. He has also been burning for several days a lamp with low vacuum to test the relative value of medium with nearer perfect vacuum. so far the lower vacuum shows equally as well as the higher.

Cleaning Mercury: Dr. Moses has been continuing experiments on cleaning mercury. particularly in removing zinc, and had arranged, a pipe about two feet long and two inches diameter with a smaller pipe attached at right angles. the larger pipe

was secured to the large lathe, to revolve inwise while the small pipe extended out ~~long~~ parallel to the bed of lathe. the mercury which was placed in the large pipe and secured with good stoppers was kept in constant agitation by ~~the lathe~~, being forced from one to the other end of pipe by the action of the lathe. could not learn the effect on the mercury.

Wood Milling Mr. Batchelor and Dean who have been at work for several days on getting up cams and perfecting machine for milling wood loops. got new cams in to night and got much better results than by their earlier effort. and by very slight changes they will be able to test the utility of the machine for the purpose intended.

Conductor Boxes Ayres all day drawing from Depot the boxes for conductors. about four miles of which are required.

April 30. 1880

HOLLY

HOLLY (L.B. 3/31/80)

While Holy one of the white holy Carbons loops (regular form) put in lamp by Flammer was exhausted on pump in dark room. gives a very nice light but the loop leans considerably

Field Dynamo. John Ott making patterns for small dynamo ~~to be~~ that may be used for field in case where but few generators are necessary. such as for Steamers, factories, &c.

Brush holders. Cunningham making patterns for right and left commutator brushes holders.

Lamp mould. The cast mould in which to blow the larger bulbs or globes of the electric lamp. finished up by Bradley and is being tried and experimented on by Holzer. has not yet proved as successful as desired.

Columbia. Several styles of devices for relieving the lamps of sudden jar, have been made and tried. using springs of various number, sizes. and ways of attaching them. but do not find springs as desirable as thick heavy soft felt, which is being used in several forms. and giving the best results.
Andrus is making switch board for the steamer,

Tramway The rails of electric tramway are spiked down as far as the ties will permit of. between one and two hundred ties being still necessary to lay all the rails on hand.

Indicating Mr. Clarke practicing and testing with indicator.

Porter here studying the nature of the work required of engines. one of which I believe has been ordered by Mr. Edison

Saturday May 1. 80.

Armature which had been brought back from Steamer Columbia having been repaired was to day shipped back.

Clamps and roller combination for rolling wires in flat and suitable shape for making into clamps, were devised by Mr. Batchelor and sketches & diagram made. the clamp is of about the same shape as those heretofore in use but of less metal and lighter. Book 51 pages 119 &c. He also instructed Wm Wright to try nickle for clamps and contacts for lamps.

Lamp conductors. Men commenced laying conductors to Street lamps commencing at generator room with six strands of No. 10 wire for each line running along the tramway. and reducing to five wires about opposite the pond.

after the wires are lain in the box they are entirely covered with gas tar and top nailed on.

Meter. Lawson commenced line of experiments to ascertain whether or not the rolling of copper plate injures the surface of the copper to an extent sufficient to cause unequal deposit thereon in the meters.

Journal calorimeter Mr. Clarke made diagram of calorimeter to measure the energy or power lost in journals of the Armatures and requested Mr Andrews to make same. Book 72 pages 145 &c.

Switch or Plug board and wheel for forming and breaking ~~contact~~ current to the small magnets used for

imparting a lateral motion to the Armatures are being finished up by Cunningham for use on Steamer Columbia.

Boiler Mr. ~~Wood~~ H. Wood opened and cleaned out the boiler of engine for the first time since he has been here, but found the boiler quite clean and in much finer condition than might have been expected.

Hydraulic press is in practical use in pressing woods (to about ⅔ original thickness) ~~for use~~ to be cut on the cam wood milling machine for use as loops.

Mercury cleaning. Dr. Moses finds by experiments on mercury that by laying a copper plate on the amalgamated mercury and covering with sulphuric acid, local action is set up which causes the amalgams to separate and leave the mercury clean and pure.

Pump. John Ott taking one of the pumps from dark room apart and carefully taking dimensions of the tubing and all parts ~~there~~ of the pump. and making full sized diagram of same for use by glass blowers, that they may make a number more, of precisely the same size, caliper, &c. to ascertain whether they will give equally good results, and will be put in old factory and thoroughly tested as the pump.

Cam, feed, wood milling machine is being run of wood pressed by hydraulic press on Saturday. and turning out very fair specimens.

Calorimeter frictional. Andrews having completed for Mr. Clarke the calorimeter around the bearings of armature journals, he assisted by C.P. Mott, made the commencement of a series of tests to be made to learn the amount of energy lost by friction in the armature journals Note Book No. 72 pages 148 &c.

Cars The frames and heavier castings of cars for electric tramway were received and men set at work placing the motor in position on engine frame, and at other work at fitting them ready for track.

Old factory. Along Rail road is being cleaned up and repaired preparatory to putting in pumps and lamp manufacturing apparatus.

Absentees. Kruesi Upton Force, Cunningham and Jehl in New York fitting up lamps, switch board, &c. on Steamer Columbia.

Wood loop lamps. Some lamps of wood carbon were measured and tested by Mr. Upton and he finds those so far made, to be uneconomical, considered due principally to the ragged or feathery surfaces. the lamp with vaneer cut loop gave 7½ candles and same down to 60 ohms hot. Book 63 - unpaged.

Clamps. Ott making very light clamps of copper. Flammer of Platina, to be tried in experiments with different metals for clamping. Flammer sent very light platina clamp. about one third the weight of those heretofore used, in a lamp which was taken off the pump in nice order.

Pumps. Preliminary work on the set or series of pumps of style and dimensions of one sketched and measured by Ott, was commenced by Bowen. making

part of 476 gauge reservoir., see order and sketch of Mr. Edison Book 68 page 85

. Mr. Honig making diagram of some pump to be set up and used in the factory for handling the mercury for the 476 pumps to be put up there, in which they are putting down floor.

Lamp Mould. The metallic mould for lamp bulbs were secured on a permanent iron base and arranged with spring to open and cord and pulley treadle for closing to works very completely. C Elger here with two samples of lead glass tubing, and took with him one of the globes blown by Boehm as models from which to make wooden moulds.

(~~[illegible]~~

Amalgate Mercury Dr. Moses amalgamated a quantity of mercury with one per cent of zinc. to experiment on its ability to electrolyse and purify itself.

Circular seive. Crosby made circular seive in graduated sections to separate sand in uniform parts for further experiments with air blast separation.

Conductors started South from Station with twenty five strands to each line.

Frictional Calorimeter test being continued by Clarke

Mercury Amalgamated yesterday by Dr. Moses was found to have purified itself by electrolysis. he today amalgamated a quantity with zinc, lead, and tin with from one to ten per cent. of some one per cent zinc electrolysed in about two hours.

Clamps of Nickel, copper and platina made much lighter than the old ones were put in lamps and one lamp with light platina clamp was exhausted, frosted and by Mr. Edison brought up to intense heat and light and stood beautifully.

Frictional calorimeter test of the ~~of the~~ energy lost by friction in the journals of armature finished and computed by Mr. Clarke. In one test of the journal next to commutator he found it to consume 900 ft pounds

in another test of same bearing found 1040 ft. carbide consumed per minute - Book 72, pages 189 &c.

Cam feed. Machine for cutting the outside of the wood loops on which Mr. Batchelor and Dean have been at work for three or four weeks was finished and is being used to day in cutting the outside only, and is very complete for that purpose; other cams being necessary I believe to work the inside of the loops, and they are now at work on them.

Opaque or crystalline globes. Lawson experimenting on coating surface of globes with crystalline by fumes did not find find the process so reliable as the acid bath heretofore used. but lacked oxalic acid to complete the experiment.

Pumps. Hammer informs me that he alone took Twenty seven lamps off the pumps upstairs yesterday and mentions it as quite an achievement.

He had observed that the Sprengle drop pumps more frequently broke or cracked at the point where the drop strikes the solid mercury column, and on having a section of the tube cut out at that point and examining it, found it contained innumerable small cracks and one place where they had apparently combined and formed larger crack not entirely through the tube but sufficient to greatly weaken it and show that the constant hammering at that point was the cause of final breakage

Conductors South from Station and all put down hereafter will be put in dry ~~box~~. unvarnished boxes and only tarred put

previous to nailing on the covers probably fully as good as the more expensive and laborious way of using ~~tarred~~ boxes, previously tarred inside and out as those first sent north from Laboratory.

Visitors A gentleman from Silver City New Mexico here and had with him some exceedingly rich gold ores.

Thursday May 6

Frictional test: Mr. Clarke made further calorimeter tests of the journals of Armature, using water much cooler than the air, and got one and one half degrees difference between inflow and outflow and as a result 1668 foot pounds against 900 and 1000 obtained in previous tests. Showing that the relative temperature of the air and water used vary exceedingly the results, but as an average he believes the journal next the commutator to consume about 1200 ft pounds and on the assumption that the other journal uses 2/3 or 800 ft lbs or the two journals use 2% of the energy of three horse power applied to generator. Book 72, page 166 &c.

He is also taking indicating cards of the engine.

Malachite. Lawson pressed on the Hydraulic press some Artificial Malachite to see whether it could be solidified or brought in condition to be used as the natural is. Had not enough John Lawson

to give it sufficient pressure but is satisfied from the experiment that it can be done if sufficient pressure is used. Also made a chemical experiment but I could not learn the object or result as he calls it his own private exp. and not connected with the branches in use or in experiment here.

Gang Saws. Wm Wright at work on gang of small saws 1/50 of an inch in thickness for sawing off the copper from the milled blocks of saw feed machine.

Work general. Dean making tools for wood milling machine. Cunningham and Logan on small Dynamo. Batchelor and Wright on Milling machine. Andrus on gas annealing apparatus for annealing the outside globe at point of connection with inner tube. Dr Moses continuing experiments on the electrolyses of Mercury. Men putting down conductors and others putting down floor in Old factory.

Pull back. Heard Mr. Edison tonight explaining to Mr. Batchelor and others his theory of the cause or point of "pull back" in revolving armature. his view being that the pull back action is entirely in the copper wires and independent of iron core. and quite fully explained the action going on in them whereby the pull back was caused.

Friday May 7.

McLaughlin. two samples of tailings from Oroville Cal. were recieved to day from F. McLaughlin and were being tried by Mr. Edison

Clamps. lamps with small clamps of copper and nickel were exhausted on pumps to day and heated up and so far appear to stand as well as the larger platina ones.

Moulds. Mr. Hornig devised and made diagram of new square nickel moulds capable of holding and carbonizing twenty five loops at once a five tier of five loops each.

Clamp Machine. Mr. Batchelor devised & made diagram of a machine for making the small clamps. Book No 51 page 137 &c.

Contact. Flammer making by suggestion of Mr. Batchelor an instrument or tool for grooving copper wire at point of contact with platina wire, to avoid if possible the necessity of soldering the joint it is composed of an iron block in which is made a saw cut sufficiently wide to just admit the copper wire, a light bar of steel about one fourth of an inch in width and of a convenient length is reduced at one end to the width of the slot or saw cut, and on the extreme end made still thinner and wedged shaped, so that when driven down on the wire it forms a groove therein, which admits of the platina wire and may be closed by pressure around them making a neat connection or joint.

Messenger Electromotor. I find in Book No. 80 page 119. a sketch and description of an idea of an Electromotor for use as a messenger carrier And in same Book (80) page 122 an idea of varying the electromotive-force by speed of engine.

Large Generator. Upton and Clarke working on arrangement of large magnet in connection with engine or motive power, and on the dimensions weight, &c. Clarke's Book No. 72 page 170 &c.

Saturday May 8.

Tramway The wheels and other castings for cars of electric tramway were received this morning, and men at work putting them together putting on seats and arranging piping for awning frames.

Clamp Machine Mr. Batchelor devising and sketching a machine for making the clamps entire, without handling and running through the different machines as has heretofore been the custom. diagrams and descriptions of same in Book No. 51 pages 145 &c.

Annealer. Annealing apparatus for outside globes finished and latter into glass house – entire – It is composed of a wooden frame grooved or rabbited, in which a

or carriage
board slides. ~~in a grove or rabbit.~~ at equal distances apart in the board are holes about one inch in diameter with screw threads cut therein and wooden screws cut to fit. through the wooden screw is a smaller hole through which the upper end or neck of the lamp is placed. the object of the screw or being to raise or lower the lamp so that the propper point may come in contact with the gas flame. parallel with and about three or four inches above the frame are secured on each side a gas pipe in which small burners or jets are arranged to throw against the desired point of the lamp. three flames from each side each striking the lamp at different points on the circumference, The flames are graduated so that every time

the board or carriage is moved in, the proper distance the lamps each time are passed to flames of less heat. The whole is then incased in sheet iron to retain the heat and keep off the air. see April 23.

Visitors Mr. Lowry of E. E. Light Co. with another gentleman was here to day.

Sunday May 9. 80

Engine. Men cleaning and whitewashing walls of engine room. and Mr. Hood took out grate and renewed fire brick and also some of the grate bars.

Globe mould. Holzier blowed about one half dozen globes in the meatic mould. and treated them into the acid solution. It may not require so much skill to blow in mould as offhand and therefore with cheaper labor, but as for appearance and time I think there is no advantage whatever in the mould.

Monday May 10. 1880

Conductors. Four strands No. 10 wire were run from Dynamo Room to R.R. Station to supply current to the rails. This will make five circuits from the Dynamos. one of six wires North ~~from~~ one of 25 wires South one of 18 wires west and one of 16 wires east.

Carbonization Van Cleve cut and carbonized some card board loops leaving them closed or connected at ends and found them to retain their shape much better than when open.

Mercury Pump. Mr. Hornig calculates 1000 lbs of mercury will be necessary to fill pipes and pump of capacity sufficient to 200 vacuum pumps. Mr. Edison decides to run the large Pump with electromotor instead of Steam.

Cam Machine is to day cutting inside of loops and finishing them up ready for saw. three of which were made to day and tried. The opperation so far shows a very large percentage of broken loops and the ultimate practicability of ~~cutting~~ cutting the loops in the required shape is very questionable

Meters. Lawson put Meters in line of Dynamo current, to be tested for accuracy with readings of Galvanometer and calculations by Francis of the amount of copper that should be deposited.

Andrews finished up working model of Electrometer. ~~and~~

Autographic. Instruments taken apart and all cleaned and polished up by Mr. Kinney. Experiment with the prepared paper used by stirring on

Autographic by laying the paper on tin foil connected to the wire and using other wire on paper. showed marks only when the one pole (could not tell which) was used as marker. changing to the other pole giving no results whatever.

Small clamps. Several lamps with small light clamps of copper and platina were lit up in Laboratory to test them. copper apparently standing as well as any, but Mr. Edison observed by close examination a beautiful bluish appearance around one of the clamps and on reversing the lamp the appearance showed itself only on the opposite clamp showing the action to be the effect of one of the poles only. which Mr. Upton for reasons given shows to be the positive pole. and attributes the color to copper vapor. and a gradual destruction of the

clamp and proving that copper will not stand long for clamp.

Visitors. James Egan a former employe of Mr. Edison's with two friends here.

Mercury cleaning. Mr. Edison requested Lawson to make an experiment with mercury by covering the surface of impure mercury with chalcophrite. A sheet of blotting paper was then placed upon the mercury and on the bottom was passed a thin sheet of carbon. Dilute sulphuric acid was poured into the vessel covering a carbon plate, the carbon and mercury were then connected by a platina wire and set away for a few days. See Book No. 40 page 111.

Carbonization. Van Cleve carbonized two moneds of wood loops cut by the cam machine, rather indifferent success.

Elec. Tramway. The road or track for elec. tramway was all balasted and finished up ready for cars, and Main Force put plug board in Station, and connected the wire with the rails.

Large Lamp. Mr. Edison made sketch of Large power incandescent lamp and gave same to Mott from which to make Patent Office drawings. The connections being made through mercury in glass tubes similar to apparatus made for carbonizing in vacuum described under April 4.

Visitor Stout of Stout & Van Winckle was here and received an order from Carman for 100 tons of coal.

Absentee. Mr. Carman left for a trip South. expecting to be gone about ten days.

Prony test. Mr. Upton making prony test of motor in Laboratory.

Wednesday May 12.

Tramway Motor was connected up and wheels raised off the floor and tested, found to run like a top. Connections made from Dynamo to wires running to the track.

Tests of Motor in Laboratory were made by Mr. Upton with Bradley methods for studying the principles and making calculations. Book No. 48 pages 53 &c.

Pyrites Lawson experimenting on the decomposition of Auriferous Pyrites. He first reduced it to impalpable powder. An iron tube was then placed in an gas combustion furnace all at an angle of about 60° and when tube about red hot the powder was poured in and allowed to run slowly through the tube. and "came out good." Probable that the experiment is for purpose of eventually extracting metal from the powdered Pyrites

Copies of specifications and drawings of part of Mr. Edisons Elec Light-Patents were copied and sent to American Consul at Geneva Switzerland

Stolen. One of the Large Street Lamp globes was taken from a tramp by a brakeman on Penn R.R. and by him returned here, the tramp skipping from the train at Metuchen.

Preliminary Statement of T. A. Edison was drawn by Mr. Edison and copied by Mott in evening.

General Work Andrews at work finishing up the working model of electrometer. Dean still on wood milling machine Cunningham and Ott on Small Dynamos. Several on Electric Engine and gang laying down conductors.

Absent. Mott went to New Brunswick to see Butler in relation to Lamp posts. sawing Holly. Bill of lumber for Mr Batchelor and to do some private business for Mr B.

Electric Tramway The electric engine was finished and put upon the track It started off and run slowly with current of 40 Volts after which Mr. Edison put it up to about 120 volts and that current gave it much greater power. the test so far as made shows the electrical parts complete and successful. but by nervousness and inexperience, Mr. Hornig who was running the motor, threw the friction gear on so powerfully and suddenly that he broke three of the Large friction wheels and thus ended the fun for today. the men are now putting on belt and pulley gear to further test the electrical application, until they can devise new gear or get castings to replace the broken ones. Late in evening Mr. Edison suggested Martin Force put up connections and give

double eccentric mechanical movement for use on engine instead of friction gear and it was decided to make a trial of the substitute

Electric Lamps in R.R. Station and repair work is being done in there.

Mercury Experiment. Dr Moses conducting experiments to determine the nature of and what if any impurities or foreign substances remain in the mercury after electrolysis, so far has been unable to discover any.

Wood loop. Two lamps of wood loops cut by Milling machine were this morning tested by Francis. Resistance cold 148 & 152 hot: 98 & 104. with 90 Volts and 15 candle power he finds 8.5 per horse power; a good showing. They were then hung up in the Labratory and in afternoon when Mr. E. put up the Electro motive Force for the electric tramway, one of them went up. but the other still burns.

120 horse power Dynamo. Mr. Clarke finished details and diagrams for the large 120 horse power dynamo. Estimating weight of Magnets at 10,000 pounds. Zinc bases 1,300 in round numbers and total weight 5.2 tons. Armature 2500 lbs. Calculations Book No. 72, page 186 &c.

Small Armatures. Tweed is winding the Armatures for the small Dynamos with but one thickness of wire, with three strands to the notch.

Ore Crusher. A No. 10. Eldew Ore crusher was secured and put in use this morning

Friday May 14. 80

Eccentric gear. Sketches of double eccentric gear for application to electric engine dated May 13. and sketches of several devices on one card made by Mr. Edison and described under Date of April 20. were brought in and put on Mr. Wilber's Book. up stairs

Meter & Motor tests Mr. Upton had large meter connected with current of main wires and two small meters on a shunted current to make a comparative test. also made test of motor in connection with meters. Book No. 48, pge 61.

Andrews is making small Prony Dynamometer to test the small dynamo nearly completed

Tramway Engine. was fitted up with belt and pulley gearing and after the belts had been well rosined

and clung to the pulleys. The car was run a number of trips to the curve and return. and made one trip with nineteen persons on board and on return trip the momentum given by the extra weight was so great that with both driving wheels sliding she struck the bumper in station with sufficient force to raise it and force the end of Station out over a foot. one trip was made to the further end of road, but the power was not sufficient to bring the Motor back ~~up~~ the steep grade and short curves. In evening the men Logan Smith and Andrus were arranging for a two foot pulley on extra shaft in place of 14 inch one that was on. for purpose of getting more power at sacrifice of speed. The absorbing topic of discussion is elec engine and gear for same.

Carbonization Several moulds of Bast fibres were carefully prepared and formed around wood for carbonization, but the wood proved very detrimental, every one ~~having~~ been broken in the moulds during the process. Van Cleve is preparing some more for trial

Saturday May 15

Elec Tramway The electric engine was fitted with larger pulley for more power on belt and pulley gear, but almost immediately on starting, it was discovered that something was wrong about the motor and upon examination it was discovered that a cross had occurred. The armature was taken out and into the Shop where Mr Upton and Kruesi removed all the wire and found the cross to have occurred in some of the first wire put on, being the extreme inside wire ~~and~~ crossed at the shaft. Mr Andrews was immediately set at work on another armature, to have it ready for trial on Monday.

Sketches of different ideas of gearing for electric Locomotive. by Messrs Batchelor, Edison ~~Hornig~~ &c. Book 51 page 167 &c. Wedge principle idea page 179 same book

Tailings Five small bags of tailings were received this morning from Placerville Col. Sent by Dr A. D. Williams. 723 Chestnut St St Louis Mo.

Carbonization Chs. Flammer prepared moulds of Bast fibre by securing the ends of the fibres in notched ~~Carbon~~ strips without using wood and got them successfully carbonized.

Absentees Mr. Clarke is in New York for purpose of getting from Babcock & Wilcox data and information in relation to their boilers economizers &c.

Meter tests ~~Geo.~~ Upton conducting a series of tests on Meters Book 48, page 77 &c. ~~Shunts of copper wire and and German Silver wire used as shunts Amount deposited in Meter weighed and the main current calculated to discover the [illegible]~~ [illegible]

Monday May 17

Engine. Yesterday Mr. Hood took head out of cylinder of engine to examine clean and oil up. found it allright and in nice order.

Armature Yesterday Cunningham and Andrews worked all day on another armature for electric locomotive and the same was put in place this morning.

Tramway after changing the smaller pulley on counter shaft for a larger one the Locomotive was again tried, ~~with~~ very satisfactory results Mr. Goddard who was here seemed well pleased with several rides he was given over the straight stretch Mr. Babcock of Babcock & Wilcox also enjoyed a few rides

Pumps Flint glass tubing for the pumps was received this morning and Bohm is at work on them. Also the ~~[illegible]~~ for pumps were sawed the propper length and sent to Butler at New Brunswick for sawing in the slots. and preparing them for the pumps.

Carbonization Charles Flammer cut slots in nickel pieces to hold fibres in place in carbonizing moulds. prepared some Bast fibre and out of 12 got ten out of moulds in first rate order. convincing himself that nickel is preferable to carbon in moulds probably in consequence of containing less air.

Meter tests Mr. Upton is continuing a series of tests and experiments with meters Book No. 48 page 85 &c.

Absentee Mr. Clarke gone to Philada carrying the diagrams and specifications of large Dynamo to Porter & Allen Engine builders.

Tramway. The engine with power from one Machine made a successful trip the entire length of the road and return. A second generator was brought out of Dynamo Station and set running in old Dynamo Room to increase the power for Rail Road. the passenger car was then attached and with Nine men on made the round trip very successfully, without accident or assistance. running the return in 1 minute 16 seconds. After which a number of trips were made all with equal success, And all the trials today have been decidedly more encouraging and successful and fully up to the most sanguine expectation with the belt and pulley gearing now in experimental use. The results have been so eminently successful that Mr. Edison and Mr. Batchelor are contemplating extending the track three quarters of a

mile with grade at one point of about 1 foot to seven. and adding three more passenger cars.
Quite a number of visitors were conveyed over the road among others several foreign naval officers. And those who have been so favored speak of the ride as exciting and pleasant.

Nickel former. The slotted nickel plate in which Bast fibres are secured for carbonizing and the one used by Flammer yesterday with good results. was by him made and sketched in Book No. 57 page 124.

Poles for ~~wire for~~ telephonic wires are being drawn and placed across lots to day by Ayers. from Machine Shop to old factory.

Clamp Machine Bradley commenced work on Machines devised by Mr. Batchelor for making the clamps. diagrams of which may be found in Book 51 pages 146 &c.

Sparkers. Four sparkers such as previously used on vacuum pumps were made to day and exhausted on the pumps to be sent, as I am informed, to West Point Military academy.

Bast fibre (8) ~~Eight~~ Eight Bast fibre Lamps are on Pumps to day being exhausted

Wednesday May 19.

Fiber turner. John Ott is making patterns for castings for a machine attachment to lathe for turning down fibre to the required size and full length of five inches

Indicating. Mr. Clarke had glass point made on principle of a fountain pen, drawn down to very fine point and ground smooth on oil stone to use in place of pencil in the Indicator and thus avoid the friction as much as possible. A very fine platina wire is used to keep the point of tube ~~free~~ clear and permit the ink to run freely. He found it to work more satisfactory than pencil. While the current was being used on the locomotive he took a number of indicator cards from the engine. (Dynamo running but locomotive off. he found the energy of the engine to vary from 6 to 9 horse power

and when locomotive running from 24 to 40 horse power.)

Carbonization. Van Cleve carbonized Seventeen molds of wood loops but with very indifferent results. All of them very tender ~~and~~ crooked and misshapen One mold in which but one loop of apple wood was carbonized came out in better shape than any other.

Recording Telephone. Mr. Edison requested Bergmann to make a very small and delicate Phonograph for experiments in connection with the Motograph Telephone The idea being that the ~~motor working the phonograph~~ Phonograph worked by the motor shall receive and record the message and the recipient of the message can at any time convenient, reproduce the message from the Phonographic Sketch of same dated May 22. Book 57 page 1895

Small Dynamo. The Resistance of magnets in small dynamo. is eight ohms. At 1640 Rev. and 25 volts on field. gave current of 166 volts. Internal resist of armature .16 of an ohm.

Visitor Mr. Wilber. A Representative of Scientific American and a number of others seen visiting the Magnetic R.R. and Mr. Wilber getting up Specifications for Patents on same.

Mr. Carman returned from his trip South.

Fibre Lamps. Four Bast fibre Lamps were sealed off the Pump in nice order.

Thursday May. 20.

Patents Mott finished up Patent Office drawings of Locomotive and attachments of Magnetic Rail way. and were taken by Mr. Wilber together with the specifications.

Ores Two bags of Ore from Boulder Co. Colorado sent by C. P. Geer agent Ogdensburgh N.Y. were received and tried by Mr. Edison. he pronounces them very rich.

Mr. Upton is conducting experiments to determine the amount of discharge from the Magnets of one machine. Book 48 page 125 &c.

Autographic Mr. Kinney has for some time been using the Dynamo current on Autographic. and is today working with excellent results through 4500 ohms wire, and is having very good results through 180 Miles of wire of West. U. Tel Co.

Carbonization Van Cleve carbonized three moulds of bent wooden loops by securing the strips in slotted nickel plates he got them out very nicely and in good shape.

Bast fiber Four of the Bast fiber Lamps were measured and tested with current of 103 volts they gave from 30 to 32 candles and about six per horse power. They were connected to main wires in Laboratory and during the first hour three of them broke in the clamps and glass but the fiber in each instance remained in globe unbroken. Showing the fiber to make ~~as~~ strong carbon but difficult to form good contact with.

Estimates for Magnetic R.R. and Equipments made by Mr. Hornig, Edison &c. Total for road and equipments 10 miles 30,000 Total working exp. 10 miles $22,00 Book No. 80 page 179

One of the hind wheels of Locomotive formed contact with frame and made bad sparks found to have been caused by bolt projecting and striking frame at every revolution. The Locomotive was run in and all the high gearing removed preparatory to putting counter shaft and pulleys directly behind and on a level with the frame of car.

Friday May 21.

Ore and refuse, Mr. McKinsey returned yesterday from trip to valley gold regions of Canada. This morning Mr. Edison panned some mine refuse, which had been worked by the mine process, and again panned by McKinsey, and found quite a quantity of very nice free gold still remaining therein

Armature of large machine is being wound by Logan with single wire for experimental purposes.

Wood Milling. Dean is jubilant over his success to day in working the cam milling machine with complete success and getting out about 100 loops of box & Holly in excellent shape and in several cases sawing them so perfectly that the whole five loops were left joined at the thick ends. Although ~~loops~~ the machine

have been worked ~~on it~~ for some time with indifferent success. To day is the first Dean has felt satisfied with its working.

Phenomena Lawson used Florence flask on steam bath for converting cupric sulphide into cupric sulphate by means of Potassium Chlorate and Hydrochloric acid, After brisk evolution of gas had taken place for some time. A loud report accompanied by flash of light was observed. This action was observed in two different experiments and in one case the explosion had sufficient force to break the flask

Small motor Mr. Upton making test of small generator wound with three wires, both as generator and motor. As motor it was run at so high speed that the armature burst. previous to which the prony had indicated one half a horse power.

Meter copper. Lawson finds as a result of exp. noted May 1. That the rolling of copper sheets does effect the surface of the plates causing unequal deposits thereon in Meters.

Saturday May. 22.

Test Mr Upton made tests of some Bast Fiber Lamps and at 15 candles gave 9.8 per horse power Also made photometric test of one of the old card board carbon Lamps to compare the economy and candle power.

Work general: Glass House pushing work on pumps. gang laying conductors to Street Lamps. Three men at old factory preparing building for lamp manufacturing. Mr. Batchelor on Machine for making small lamps occasionally stopping to discuss gear question for Magnetic Locomotive. Men, changing counter shaft and pulleys on electric Locomotive,

Visitors. Mr. Baily. and also Collins of New York Herald here.

Monday May 24

Mc Intire. Sundays "Sun" reports death by Drowning, of Henry M. Mc Intire a former employe here. drowned at Carondelet Mo.

Telephonic Phonograph. Sketches made and given to Mott from which to make Patent Office drawings, mention of which is made under date of May 19. under head of Recording. Telephone

Small dynamo burst in testing as motor having been rewound was to day Shipped to Geneva Switzerland

Visitors. Large party of tourists from Europe and Australia. Absent Mott, home on visit on return Monday night can learn of nothing new or startling.

Thursday May 25

Carbonization Van Cleve carbonized a few molds of wood loops, securing them in the nickel plates slotted and prepared for them and brought them out much nicer than when carbonized loosely in molds. but melted one mold inside. that showed no signs whatever of melting on outside

Magnetic R.R. The locomotive of electric R.R. having been equipped with counter shaft and pulleys back of car frame and belts of six inches wide was tried this forenoon by Mr. Batchelor Kruesi and Force. They lined the heads with leather, and at first trial trip went off the lower end of track without any appreciable diminution of speed breaking the large pulley and depositing Mr. Batchelor on top

of pile of cord wood without choice of sticks to rest on. Now having found both ends of road, thinks he is solid. The engine was returned and pulley replaced, leather removed from heads after which a number of very successful trips were made

Wood loop lamp tested. At 16 candles 83 ohms cold 50.2 ohms hot 7 per horse power same lamp at 30 candles 48.6 ohms hot. 5.5 per horse power Francis's books unnumbered and unpaged.

Pantagraph Andrews making a Pantagraph of but four parallel arms each three feet from center to center of connecting points. devised and sketched by Mr. Clarke and much simpler in construction and working, than one of Brown's previously used on the engine here.

Visitors. Mr. Bailey here this morning and Mr. Edison went with him to New York. Also Safety rail. R.R. Man with a couple friends spent part of day here

Large Dynamo. Tested by Mr. Upton. Magnet 1.94 ohms Magnet 4 per horse power. 9. volts from armature running 100 Rev. per Minute. Book 48 page 197 also Book 37 page 192 &c.

Gum & Resin. In completing experiment on removing Gum and Resinous matter from wood, conducted by Lawson and noted under date of April 9. He found Oak lost 12.8 per ct and Pine. 13.37 per cent. the lowest and Rose 38.76 per ct. Mahogany 31.06 per ct the highest, Dried on Steam bath, They were then exposed to the Air in Balance Room about 24 hours and reweighed. San Domingo Mahogany & Dogwood neither gained or lost. Orange, Sassafras & Mahogany only lost weight. All others gained from 4 to 20 Milligrams, White Pine gained least and Canabola the most by exposure to the atmosphere.

Station. Platform extended all around the R.R. Station Electric head light and bell put on the Locomotive, Mrs Edison and some of her friends riding on same in Evening, probably the first electric lamp ever used as head light.

Annealer. Andrews at work on gas annealer for outside annealing of globes similar in principle to the one described under date of May 8. excepting the present one is being made round and combines part of hub and arm arrangement of the one used for inner wire annealing described under date April 12.

Telephonic communication established between Dynamo Station and Laboratory.

Absentee Mr. Batchelor at New York.

Tests Mr. Upton making further tests of the large Dynamo but with about same results as mentioned yesterday

Brush holders. Mr. Clarke has completed a diagram of new brush holders designed for the Large Dynamo. Arranged to act independently of each other taking much less room than the style heretofore used. and designed for three on each side of commutator.

Nickel Plates. Van Cleve had Nickel plate slotted to exactly fit the wood loops as milled by machine leaving on ends one half inch slotted wide in which the broad part could draw up in shrinking. Slots made just deep enough to admit the loop and clear the plates plate placed on top as weight. this style were found to retain the carbons in much better shape during the process and some now have been made by Flammer.

Old Factory. The mercury pipes for the Power pump were received today and the tables for glass blowers made ready for the gas fixtures.

Mercury experiments. Have been continued by Dr. Moses and the method of cleaning by electrolysis so completely successful that arrangements are being devised for working the method on large quantities by use of a large number of large shallow pans arranged so the mercury may be drawn from one series to another until thoroughly cleaned and deposited in reservoir.

Ores & tailings. Dr. Haid assisted by Conly is experimenting on economical mode of working refractory ores. and are using the furnaces in a

Visitors Bailey, Wilber & Goddard

Maj. Frank [illegible] R.R. Co.

Friday May 28.

Pump boards were returned from A. J. Butler's cut and prepared for pumps except the depressions for gauge bulb and other large tube parts which are being cut on the drilling machine. One of the pumps was mounted and glass blowers all at work preparing the others for mounting.

Bast fibres. Flammer carbonized some bast fibres all originally five inches long and of different diameters to measure for resistance. .040 had 30 ohms. .020 - 105 ohms & .014 - 160 ohms resistance. Three loops white Holly perfect shape and fine appearance carbonized in slotted nickel plates tested 197 - 270 & 325 ohms resistance. Thus showing great inequality in conductivity without any apparent cause or reason.

Magnetic R.R. Motor used but little today but working beautifully. first blood by running over a turkey.

Glass Heater. Andrews finished Apparatus for holding and turning the prepared globe glass, over gas flame for heating it preparatory to blowing into globes. It is composed of two endless wooden chains each passing over wheels notched to fit and receive the links, which are notched in the center from the upper side with grove sufficiently wide to easily admit the drawn ends of the tubing prepared for blowing into globes, and allow them to revolve lightly therein. Over two other plain wheels is drawn a narrow belt of canvass or other suitable material which passes under the tubes sufficiently close to raise them slightly off the bottom of notch in one of the chains. On one of the plain wheels is a crank and by revolving the belt is moved along and by the slight friction on the glass tubes causes them to revolve as rapidly

as may be desired. By another crank on the chain wheels, the tubes (previously placed in the notches) are moved along and brought at rest one at a time over the blow pipe gas flame and by the revolving belt are made to revolve and heat equally all around after which it may be lifted out and blown and another immediately moved into its place over the fire by movement of the chain, by means of the crank attached to the chain wheel. See May 31

Visitors Mr. Wilber. Collins (of Herald) and a gentleman from South America.

Absent. In afternoon Mr. Wilber and Mr Edison took a ride, as I was informed, over to Port Amboy.

Saturday May 29.

Ores & tailings Seventeen or eighteen bags of Ores and tailings were received today ~~mostly~~ from Powers claim and sent by McLaughlin. Mr. Edison has been testing some of them Books opp 15 to

Friction Gear. Two moddles of Napier's friction brake and same principle applied in a complicated way to reverse gear. were received today, to study their adaptability to the electric engine.

Large Dynamo. The core of the Armature of Large Machine was turned off so the iron would come nearly an inch from the Magnets it was then wound with single wire and tested, gave one volt less than when out full and near the magnets.

Pump. One of the new pumps was set up and tried with lamp. a good vacuum was obtained and lamp sealed off in two & one half hours. ~~the~~ Moffet is at work hanging other pumps. as fast as they are completed.

Mercury cleaning. Dr Moses informs Mr E. that by electrolysis he has purified all the Mercury. has worked the entire process down fine and is ready to clean up and commence on other experiments.

Work general for the closing week and to day two men preparing the sleepers for extension of R.R. Four ballasting and shaping up old track. gang putting down conductors to street lamps 2 carpenters at work in old factory Mr. Batchelor & Force making and preparing to put up clamp machine, Cunningham & Bradley on Small Dynamos. Glass blowers on pumps. Labratory very quiet.

Sunday May 30.

Cupriles. The experiment to decompose mentioned and commenced under date of May 11 was completed to day by Mr. Edison examining the vessel then prepared and set aside and found the chalcopyrites had neither amalgamated nor disturbed the mercury. see May 11.

Track conductors. Having had heavy rain (the first since the R.R. has been built) and the ground ties and atmosphere being very damp to day Mr. Edison had the ~~[illegible]~~ rails tested to find the leakage and resistance caused thereby. It was found to have thirty ohms resistance with one cell of battery and a very slight lessened resistance when numerous cells were applied. And states that at that ratio. five miles of track would leak one half of the current, but no care

whatever has been used to insulate the present rails and the loss could undoubtedly be largely overcome by some attention to insulation.

Telephonic Experiment was made on the rails with a Bell telephone. No results or sounds whatever could be obtained with no current but on applying one cell of battery sounds were sent and received through the length of the rails but not very clear or distinct.

Ores & tailings. Mr. Edison is to day much interested in testing the ores and tailings received from McLaughlin And directed Lawson to make certain experiments for removing the coating from particles of gold so they would be rendered in a state subject to the action of mercury.

Monday May 31

Columbia. Dispatch received this morning from Steamer Columbia states she arrived safe in Rio — and that the Edison light is all right.

Oxides. The apparatus made for carbonizing in vacuum was repaired by order of Mr. Edison, for the purpose of experimenting on reducing oxides at very exceedingly high heat, the attempts to be made both in vacuum and in atmosphere.

Laws of Dynamos. Mr. Upton is conducting a series of experiments to determine some of the laws governing the construction of electric generators, and to study the economical proportioning of the same, and for determining the best method of winding armature of 120 H.P. [?] Dynamo, which has been determined to be constructed with 47 commutators

Glass Heater. The device for carriage of tubes over blowpipes described under

May 28 was tried by Mr. Edison in the glass house to night. I find that the intention is to move the machine with power and use several graduated flames instead of one as intimated May 28. and that it is intended to heat only about two thirds when the tubing can be taken off and the balance of heating and the blowing done in the ordinary way.

Ores. Several packages of Ore &c were received to day. some from S. D. Denton Newport Benton Co. Oregon. And Mr. Edison is devoting a large part of his time in examining ~~and~~ testing and experimenting on them

Absent. Several of the Shop men are absent to day. probably "Decorating" as this is decoration day.

Tuesday June. 1.

Friction Gear. Mr. Hornig devising and studying means of applying principle of Napiers Friction break to the gear of electric engine and made diagram of a gear combining partially the principle of Napier gear with a clutch and eccentric.

Chlorine water. ~~The~~ Mining men from California were here to whome Mr. Edison demonstrated and explained the method of cleaning mercury by electrolysis [and concentrated medium in few minutes that had been entirely [illegible] and showed by appearance whatever of long way] also explained to them how cheaply chlorine water could be made and had a battery jar filled with salt and water, (I should judge about one pound of salt and two quarts of water) a paper partition was then placed in the jar and a carbon plate immersed in ~~each~~ water one on each side of paper the electric current derived from the Dynamo line was then passed through

by connecting to each carbon plate. In very few minutes the gas ~~could be~~ was quite perceptible to the smell and soon after, the water on one side of partition began to turn green and the water of that side smelled strongly impregnated with gas. The process was pronounced a very simple and cheap one, and the visitors were much interested in the two processes mentioned [as both are valuable to mining interests] they were then taken over electric Rail road and their astonishment and admiration was complete, also: [explained to them a method of purifying mercury while being used in mining process.]

Oxides Dr. Moses had a small piece of common carbon about three fourths of an inch long 3/16 square dished out in center sufficiently to hold a small quantity of Oxide it was then connected [by platina tongs] to the wires of the vacuum machine and the current turned on, it was kept at bright white heat for about one minute, but the operation did not reduce the oxide. During the preparations the cap or bulb which formed the vacuum chamber had been broken so the trial was not made in vacuum by which process Dr. Moses expects better results

Bast fibre. The machine for turning Bast fibre on which John Ott has been at work for about a week was tried by him today but with no success. The machine is a delicately made Lathe on a Lathe bed. with screw feed to be thrown in or out as desired and intended for the fibre to be held taught between clamps ~~attached to made~~. in which the ends are secured and the knife or cutter made to revolve with great speed by light round belt from counter shaft. secured on table in connection with the Lathe. He is still at work on the machine and will perfect it if possible.

Six Dynamos. Mr. Edison made sketch of a combination of six horizontal Dynamos arranged for four bearings. Also sketch of new form of electric governor which increases or diminishes the amount of current by raising or lowering a cylinder insulated at entire circumference of one end ~~of cylinder~~ while at or near the opposite end the insulation gradually diminishes in width till lost in a point

in such manner that in revolving the conducting one half surface of the cylinder will remain in contact with the brush or spring, through a greater or less space according to the perpendicular position of the cilinder which is raised ~~regulated~~ by the ~~speed~~ revolving speed of the governor. Both of which were given to Moto from which he was directed to make patent office drawings.

Old factory. The carpenters at noon today finished all present work in the old factory, having made in addition to the pump frame ~~made~~ tables for about twenty-four glass blowers. One double table in center of room to accomodate 8 on a side and one next outside wall for about same number. Also bench to accomodate five persons for putting carbons in clamps & clamps on conductors &c.

Visitors Three young men (Swiss) who made the entire rounds of the place without making themselves known to any one until a short time before leaving when Mr. Kruesi learned one of them to be an electrician with a light and an opponent of Mr. E. and his lamp and entire system. "Check."

Wednesday June 2. 80

Mercury Electrolyses. Mott is making Patent Office drawings from sketches made by Mr E. of two machines used in mining operations (in connection to which he has applied with the application of) means for keeping the Mercury in good state by electrolysis during the time it is being used in the amalgamating machines. from suitable electric machine the wires are connected one to the shaft and the other to the sheet iron or other metallic lining of a ~~same~~ cylinder or barrell, so that the current passes through the contents of the barrell. probably water and the Ore and Mercury, intended to amalgamate the same. and by the electric current the mercury is kept clean, as his demonstration in Laboratory show that an electric current produces wonderful effects in purifying mercury.

Patent. Herald of to day announces that Patent was yesterday granted to Mr. Edison for magnetic Ore Separator. described under date of Mch 25. wherein magnets are used to change the trajectory of the falling ore or sand. Representative from Scribners here ~~to~~ got from Mr. Edison a description of the apparatus and principle. and the uses to which it could be applied. He pronounced it the most interesting if not the most valuable subject he had received from here.

Pumps. which have been idle for past ten days in consequence of sickness of Hammer were to day set at work by Geo. Hill. One hundred of the pumps for ~~Lamp~~ factory were finished by the glass House last night and are being mounted by Moffet. and tested by Nevig-

Allumina Exp to reduce Allumina were again tried by Dr Moses. He took top from the Mercury Vacuum pump and secured to the plate of same, a charcoal piece hollowed out in center to hold the

Allumina, and the whole placed in the hand vacuum pump and vacuum obtained. the resistance of the charcoal however was so great that the current passed rather like an arc or spark breaking the carbon & throwing and broke and threw out the allumina so that no results were obtained. Mr. Edison directed him to make the receiver of carbon reduced to give high resistance only at the point where the allumina was contained.

Gear. Mr. Hornig made diagrams of x gear for electric engine using the Mason's clutch and wire ropes and coupling it 1 to 8.

Carbonization. Flammer fixed up a bellow blower in connection with a Bunsen Gas burner in a small circular furnace. to see what heat he could get on the carbonizing moulds. He got as high heat as needed but owing to the crudeness of the apparatus, was nearly an hour in obtaining the ~~result~~
Van C. got out some very perfect wood carbons from Slotted nickel plates.

Water. Carpenters are trussling out in Pond preparatory to putting in pipes to obtain larger supply for the boilers.

Lathe. New Stewart Lathe received and set up ready for work.

Visitors. Four gentlemen from Columb S.A. were here to day and manifested considerable astonishment at the extent of Mr. Edison's work and experiments, and were particularly enthusiastic on the Electric Rail Road. they were taken over the road several times and trip being made down in 3/4 of a minute and return in 1½ minutes. Mr. Upton then measured the wheels of Locomotive and found that to run the 2200 feet of track in one minute the armature would have to make 2200 Revolutions per minute.

Plumbago. Mr. Batchelor had some Plumbago pressed in the hand press in Laboratory. for purpose of turning it out in rings of .005 square, to make another experiment with that substance for incandescing loops.

He got one ring off very nicely but not entirely to his satisfaction. suggests to have some pressed on Hydraulic Press. and make some different tools from those used in cutting tonight. hopes by compressing it more solidly and cutting it with tools especially adapted. he can get better results.

Wood milling. Dean commenced on another method and device for milling the wooden loops. The inside will be cut by same process as heretofore. but the outside will be cut with a revolving face tool. and the block arranged on a double carriage and by cams or other devices discussed, will be made to travel along and revolve in such manner that the face cutter will cut the wood to the proper shape and thickness.

Rubber. Pure mercury. was used to test the new pumps and it was found so amalgamated that the same was investigated. Dr. Moses took some of the rubber tubing which had been in use

and found it to contain comparatively large quantities of zinc in the inner lining while the outside contained lead.

Cars. Part of the castings for the three additional Passenger cars were recd to day

Lamps. The pumps having been idle for some days. the Glass Blowers have given their entire time to making pumps but Holzer is today working on lamps and will probably be delayed in pump making. by keeping the old pumps supplied with lamps.

Friday June 4.

Elec Motive force. Mr. Clarke finished his calculation of the fall in electro-motive force in a system of conductors and lamps as established and put down here in the Park. with view of devising means of maintaining the same constant and further calculating the additional cost of maintaining it by feeding the mains with extra conductors and the points where such feeding can be done most effectually and economically. In line of 1800 feet in length supplying 30 lamps of 100 ohms each the decline in electro-motive force is from 100 volts at machine to 87.6 at last lamp. and on same line resistance of 100 ohms in first lamp in circuit is reduced to 3.6 ohms when the 30 lamps are in circuit.
Calculation Book No 66 pages 130 to 145 and 160 to 180 &c.

Large Globes. I discovered last evening that some of the large globes were breaking in consequence of the swelling of the pine posts due to the rain and damp weather. Mr. Kruesi this morning sent a man to examine them and about one half dozen were found broken.

Tramway. Bancroft of Boston Herald here and having a few minutes was given a ride over the electric Rail Road on return trip, the brakes were not put on soon enough to prevent a pretty severe bump against the bumper and giving all hands a pretty good shake up. but no serious damage was done, beyond breaking one seat and bending the iron coupling between car and Locomotive. repaired and ready ~~to run in about~~ and was run in about one hour.

Hydraulic Press. A new armature was put in the Motor in Laboratory and connected by belts with the Pump of the Hydraulic Press to prepare for getting

More pressure on plumbago for Mr. Batchelor's experiment. A cross ~~in~~ each ~~magn~~ each pole of the magnet with the base was remedied on one, but it was found that full current very quickly formed cross with ~~base~~ shaft of Armature and it was removed to be remedied.

Wood Loop Lamps. Fifteen lamps of wood loop were connected in main wires in the Laboratory down stairs for test of their endurance stability

Cars. Two of the carpenters are at work on the frame &c. of the cars for which the castings have been received.

Absentees Mr. Edison went to New York on 3^{20} train returned early in evening. Mrs. Edison also went on same train for trip west.

Magnetic traction. Apparatus finished by Andrus to test the efficiency of magnetic traction for giving friction. No thorough test made. Late in evening four batteries were tried but did not give sufficient current to magnetize the discs.

Saturday June 5.

Visitors. Messrs Lowrey and Goddard were here and after assurances from Mr. Edison and Kruesi that it was perfectly safe and free of danger were persuaded to take the second ride over the electric tramway. All went very well ~~until~~ and with fearful speed until the curve at Freeman's road was reached, where the motor jumped the track throwing Martin Force and Kruesi off and running over the ties seventy yards before it came to a stop. No one ~~being~~ was hurt ~~and~~ no damage done. In very few minutes the motor was again on track all on board and running.

Magnetic traction. Apparatus for testing magnetic traction was today tried with current from Dynamo on magnets and the increase of friction or resistance due to magnetism was by means of a scales determined as one half horse power. The machine was constructed with two magnets set in journals at right

angles to each other and with the disc faces in contact at the apex. The magnets were single, about two and one half inches in diameter and six or eight inches long. On the face of one was secured a disc a shade larger in diameter than the magnet and placed so the edge pressed slightly against the face of disc of other magnet, the latter disc being probably ten inches in diameter and the traction or friction was caused at the point where the discs touched, less, I should judge, than 1/4 in square.

Alumina Experiments. Dr. Moses has been continuing experiments to reduce alumina but has not yet gotten the sensible slight enough to give sufficient resistance to get a very intense heat.

Pumps. Holcomb commenced carrying the first lot of one hundred pumps down to Lamp factory to day.

Work general. During the week Mr. Batchelor & Martin Force on clamp machine. Ott on turning Bast Fibre. Andrews on circular annealer for outside globes. Bradley and Andrews on apparatus to try the power of magnetic traction. Glass Blowers on Pumps. Two or three on extending track of electric R.R. Gang on laying conductors. Three mounting pumps. Cunningham on small Dynamos.

Gauge. Lawson had a gauge, sealed to reservoir by Holzer, to determine the increase in volume of water due to the addition of the various salts. Equal quantity of salts give same increase in any volume of water, sufficient to dissolve it. Private exp. further particulars not obtainable from him.

Monday June 7.

Test. Mr. Upton again tested one of the small dynamos with about same results as previous tests. He was unable, with 75 volts, to saturate the cast iron bars of the magnets. The inability to saturate is explained as due to the resistance to magnetism of cast iron in consequence of the amount of carbon it contains. Test was to determine the electro-motive force at varying saturation of magnets. Both 48 [illegible]

Allumina Dr. Moses having made a very thin crucible of box wood and carbonized it, Today succeeded in reducing Allumina to Metallic form. giving alluminum of very metallic appearance under the microscope, but no determination of its being really metallic was made. The box-wood charcoal crucible was fitted between two carbon strips and placed in ~~vacuum~~ pump and good vacuum obtained, the crucible was made exceedingly thin to secure high resistance, and intense heat was given it by the electric current. He is making some more crucibles and will make further experiments.

Ores (?) procured near Washington Rock yesterday by Mr. Edison are being examined by him today. finds in the sample tested, a little copper but no valuable metal.

Mercury Pipes. The pipes (iron) for the mercury power pump were cleaned inside and steam forced in and through them from boilers, preparatory to putting in in lamp Factory.

Brush holders. Mr. Edison made sketches of brush holders for the 120 horse power dynamo and gave to Mott from which to make Patent Office drawings. See also May 27.

Fall of Electro Motive force, or Potential. Nine ~~coils~~ of wires of 100 ohms resistance each ~~and~~ representing about a lamp each were made for experiments to determine the fall in Potential or Electromotive force.

Bast Fibres. Ott having for present discontinued work on machine for turning fibres. Bradley has taken up the matter and is making

very simple former and cutting arrangement for getting them out square, and with flat ends for contact. he cut out one or two in evening and the first attempts gave very good fibers gauging almost exactly .012 (as required) and gave very encouraging results for first trials.

SAWYER
Sawier Lamp. A broken Sawyer lamp was received from some source this A.M. From what has been written about Sawier's lamp one would infer it was similar in construction &c. and a rival of Mr. Edisons Lamp. As for appearance and mechanical construction they are about as much alike as a bicicle and compound double condensing engine. And as a rival for practical domestic uses, no more so than a Brush, or any other complicated intense arc light.

Visitors Mr. Ruskas and several others unknown here.

Absentees ~~Otis~~ Mr. Edison Sen. left with McKenzie for a trip in Canada.

Tuesday June. 8.

Ore Twelve bags of Stamp mill tailings from Consolidated Virginia mine were recd. this morning. Two barrells which had been expected for several days were also found in the yard.

Ties. Some ties from Penn R.R. are being drawn up to use on electric R.R. for more securely holding the spikes ~~being~~ hard well seasoned wood.

Moulds Chas Flammer is slotting some nickel plates in which to carbonize the Bast fibers from the instruments or machine made by Bradley.

Ore washing Mr. Edison connected the neck of a large funnel by rubber hose to the water pipe and filled the funnel with tailings or crushed ores and turned on the water for experimenting on washing ores in that way. the water being forced up through the funnel it was expected would carry off the lighter parts and fine dirt allowing the gold to settle in bottom of funnel

Potential. Hood run engine late to night for Lehr to make an experiment with the resistance coils he had prepared each of the ten to represent a lamp of 100 ohms. the purpose of the experiment being to determine the fall of Potential. The fall through the ten resistances was from 84 7/8 to 79 2/3 volts and from 16 1/2 to 12 1/2 candle power.

Visitors Mr. Bailey & Puskas. also Diego de Castro Leonne de Chili and several of his native friends.

Absent. Mr. Batchelor went to New York (I believe) to meet his sister.

Chlorine water. Moffett made a box with a double wood perforated partition, set about one inch apart ~~between which~~ and space between filled with asbestos. for experiments on making chlorine gas or water. in the large apartments ~~[illegible]~~ to ende was placed common salt and filled with water a carbon plate was immersed in each and current connected. the apparatus worked nicely. and gave good results. same mode of generating the gas and saturating water described under date June 1.

Pumps. Men mounting and carrying down the second hundred of pumps to Lamp Factory.

Fibre cutter. Bradley working still in better perfecting the instruments for working bast fibres.

Absentus. I was absent (at home) during Wednesday and Thursday. learn particulars given above on return. Also that on ~~Tuesday~~ the Elevated R R men where here

Wood Miller. Dean finished and is trying the new milling machine with face cutting tool. It does not yet come up to his expectation and he is not happy

Magnetic Break. Mr. Kruesi made diagram of application of magnets to opperate on double break like now used on Steam Locomotives To the joint in center of break arms is secured a mass of iron. above which are secured the magnets. which when charged by the current attract the iron at joint towards them very powerfully thus forcing the brake blocks against the wheels.

Mr. Edison suggested several other ways of applying the principle and also suggested and explained the power that could be derived from the insertion of a copper cylinder in the magnetic field

Bast Fibers. Bradley got out a few Bast fibers which were carbonized by Van Cleve. They came out very nicely appearing as smooth and solid as steel. The former in which the fibers are cut is composed of a split steel bar, with groove in outer edge .012 of an inch ~~deep~~ and of same width when the split bar is brought together by pressure. The fiber is first shaved down in a shaver with knife set like knife in a plain. and the fiber brought gradually nearer the knife by screw which acts against it. The fiber after being thus reduced one way to nearly the required thickness is ready to be placed in one of the groves of the bar and shaved down exact. after which it is placed in the opposite grove and shaved exact the other way, coming out perfectly smooth and square and with widened ends for good contact

Annealer. Five round annealers are now in course of construction. The principle being the same as one described under date - May 26 The ~~circular~~ ones now being made being circular and the wooden disc in which the lamps are secured is made to revolve so as to bring the lamp each time in gas flame of less heat until it has completed one revolution of the disc when it is ready to be removed.

Magnetic gear. Mr. Edison made a sketch of an idea by which the resistance of a copper cylinder or armature, to revolve in a magnetic field might be made available as a gear to take the place of a friction ~~or other~~ positive gear. The sketch made by Mr. Edison represents the magnets attached to and revolving with the axle of driving wheel, and a copper

cylinder secured to the shaft of the armature revolving between the poles of the magnets or in the magnetic field. The magnets being charged offer great resistance to the revolution of a copper mass. and thereby make a powerful, smooth gear but not positive.

R.R. Extension. Men are at work on extension of the Rail Road.

Absent. Mr. Edison left on 10 ºº train east returning in early evening.

 Saturday June 12.

Bast Fibres. Four Lamps were made today with bast fibre carbons made from fibres worked by Bradley on new cutter. One of carbons originally 4 5/8 in long & 12/1000 square gave 336 ohms resistance. Two of the lamps were exhausted on the pumps and heated intensely by Mr. Edison they heated very evenly and gave beautiful light.
Mr. Edison observed that the Bast fibres shrink in carbonizing about 17 per cent against 33 % shrinkage in paper, woods &c.

Ore plating. By direction of Mr. Edison, Lawson commenced experiments on the extraction of silver from ores by rendering them in a state susceptible of being utilized for plating, Some of the ore was taken and enough solution of Potassium Cyanide in water added to make a thick paste of the mass, all was then thoroughly mixed and incorporated and two

copper plates, connected as the two poles of
a battery, placed therein, The experiment was very successful and a thick plating of silver was deposited on one of the plates.

Screw Gear

Visitors. Painter of Phonograph.

Work general. during the past week, Dr. Moses continuing experiments on the reduction of Alumina. and on making carbonized boxwood crucibles with which to conduct the exp. but has had no further success in reducing it. Glass Blowers at work on pumps. Bradley on machine for ~~washing~~ Bast fibres. Batchelor, Force, Ott & Andrus on different parts of clamp machine. Cunningham on small field Dynamos. Horning on gear for Elec Locomotive Clarke on means of most economically maintaining the electro motive force in large circuits and systems. Carpenters on new cars and gang on laying conductors. And a few on Rail Road extension.

Ore plating. Mr. Edison yesterday, made further experiments of removing silver from ores by depositing it as plating. He added to the ore and water common salt. and immersed the Poles of the battery. it was expected the action of the current would generate chlorine water, which acting on the silver ore would reduce it to Chloride of silver and thus in condition to be made available for plating which is also accomplished by same electric current. On examining it this morning he pronounced it a failure

Papers. Sun of today contains one & a half column article on Edison Electric Light. A very fair, and for that paper, a very favorable article. but the writer takes no responsibility for any of the claims. prefering to use Mr. Edisons sayings and declarations, as the basis of the and comments very cautiously.

Shipped New Lathe (Stewart) recd here June 3. was packed for shipping to South America Ambarcias.

Bast fibers. Bradley moved with the instruments for cutting out the bast fibers, up stairs in the Laboratory. having cleared up Mr. Batchelors old place for the purpose. He got out in the afternoon about thirty very nice specimens. By suggestion of Mr. Batchelor, Chas. Flammer. cut a cross slot in each of the nickel plates used for fibers. the cut is directly across the main slot at the end or widened part of carbon. the fibers having a hole through them at that point. A small bit of platina wire is passed through the hole and being then placed in the cross slot holds the one end from drawing up in carbonizing and the shrinkage being calculated in the length. it is placed in the plate at such point that the shrinkage will draw up the other end to point. where said cross slot would intersect the opposite heel, and thus bring the ends opposite and on a line with each other.

Mr. Upton made some tests on one of the Bast

fibre lamps but did not entirely complete the test because of the current being required for the R. R. the lamp will admit of one and a half as much again radiating surface and still give 8 per horse power it is now burning at minimum candle power and about seven per horse power and giving one fourth more light on edge than on face. At that heat however, the bluish vapory appearance presents itself about one of the clamps.

Ore Exp. Mr. Edison took a quantity of the samples from Virginia Consolidated mines and placed it in large box outside the Laboratory and is conducting some experiments on it, with the secret process. The material is said to contain gold & silver.

Cars. One of the new cars with removable side boards was put on track to day and a number of English people being here the train was run a long time and on one trip carried sixteen persons down and back very successfully.

Visitors English party & McLaughlin

Allumina. Dr Moses made device for holding the small carbon crucibles between carbons plates lightly held against the crucible on top and bottom by brass springs which also serve as the conductors. He got an intense heat but could find nothing of the contents of the crucible., the carbon plates between which the crucible was held proved not to stand the intense heat. and he is today preparing plumbago discs for that purpose.

Bast fibre The lamp on which Mr. Upton made tests yesterday was kept at about forty candles for some time this morning: it was then reversed on the wires for observations on the vapory appearance around the clamp. but broke about middle of the loop soon after.

Partition Lamp Mr. Edison was of opinion that the carbon was being carried from one side to the other of the loop directly across and for further investigation he had a lamp made with a boat shaped glass partition attached between the conducting wires and extending nearly to the top

of the loop at right angles with the faces. The lamp was on pumps but not yet heated.

Gear Mr. Honig devised and sketched a novel gear for attachment in front of motor to climb steep grades. Its motion and action is very similar to hand over hand climbing, being composed of arms and clutches which grapple the rails, one of each side and by a cam movement the clutch is released arm raised up and extended, dropped down on and again clutched on the rail. The arms acting alternately so that one is always clutched and drawing.

Lamp factory. The iron pipes which have been cleaned and prepared ready for putting up were ~~yesterday~~ Today taken down to the factory. Nearly two hundred of the glass pumps are now down there.

Rail Road. The motor was somewhat improved in appearance, by having the wires concealed and the switch levers covered with a board to protect ~~them~~ and conceal them.
The tow car was last night taken off the track

and double break put on. worked with a wheel and chain and the breaks acting simultaneously on the outside of wheels front & back.

Clamp Machine. Is now assuming an appearance that indicates its purpose and the manner of its working. The bender and two punches and apparatus for lifting off the finished clamps are now on none to my knowledge having yet been tried except the spring device for lifting off the finished clamps which works very nicely.

Copper cylinder. Pattern was made for casting of copper cylinder with which to make the experiment to determine the amount of power in copper cylinder revolved in the Magnetic field.

Laying Conductors. Work on Laying conductors to Street Lamps has been suspended for a few days. cause delay in getting wire.

 Wednesday June 16

Tailings five bags received from Lazard Bros. taken from the Tunnel Mine. some of it very rich a small handful showing eight and ten colors.

Specific Gravity. Dr Moses had Boehm make x a very delicate apparatus for testing the specific gravity of metals ores & to ascertain whether they contain metals. It is composed of a small cup shaped pan in which the substance may be placed, joined by ring to a bulb partially filled with mercury above which is a considerably larger bulb containing air and still above is a long slender tube that may be sealed off as desired. the whole is made of glass and both bulbs are made air tight, on top of the neck is permanently secured another cup similar to one on bottom. the apparatus is immersed in water and the mercury in bulb always draws it down to a certain point and by placing the material first in the top vessel and by adding weight sufficient to immerse to a certain point, and then

placed in bottom vessel and weights added in the top vessel to immerse to the same point the specific gravity may be calculated or at least that is the modus operandi of Dr's experiments made to day..

Alumina. Dr. Moses tried another experiment to day on reducing Alumina. using plumbago discs as conductors in contact with the charcoal crucible, the product ~~showed~~ appeared very metallic under the microscope. but Mr. Edison thought it was fused alumina, the plumbago crumbled almost to pieces under the heat, The stop cock was opened to admit the air before the carbon and parts had lost their red heat and the instant the air reached the globe & tube covering of the pump. an explosion occurred breaking the globe, It was thought due to the formation of carbonic oxide which was ignited by the heat of the crucible

Absent. Mr. Batchelor left to day for a trip with x his family and sister,

Spectroscopic examinations of the fibre lamps were made to day by Prof. Young. he got carbon lines in all cases except on the last lamp tested which was the partition lamp with low vacuum. he got two lines of Hydrogen. Having been convinced that the vapory appearance and slight deposit on the negative clamp was carbon in some form. the questions arose as to the cause, remedy, and whether the carbon was carried along the loop or passed across from one side to the other, The action being observable only when lamp is at intense heat and current of high electric motive force, Those were attributed as the causes. and by discussions it was concluded that the carbon was carried along the loop and not across. as was supposed by some. To further convince themselves of the action, An experiment was made by, placing a thin copper wire in a W shaped glass tube filled with Metic solution. and passed the current through to observe the action of the deposit of the copper and the points from which the metal was carried.

On the first experiment the wire was eaten off at the positive connection or clamp and ~~do~~ again reduced quite thin at about one third of the length of wire or at point where the larger part of the carbons have broken. and depositing of the metal heaviest as it neared the negative connection. This experiment showed that the carrying was entirely along the wire. as no means were allowed for the current to pass or jump across. further experiments are being conducted. ~~as~~ As remedies it was suggested to reverse the current frequently, as another to taper the carbon thereby giving it more substance to loose, and permit it to equalize itself. Another was by use (in some way) of magnets. and experiments requested to be made on the different ideas.

Rail Road. Marby with his men commenced to day working from six o'clock till dark, on the track of electric Rail Road and to night made great improvements in the curves and track down nearly to Moffetts crossing.

Gum & Rosin. Lawson extracting gum & Rosin from Bast fibres. 100 ~~milli~~grams been used for experiment

Lamps. The lamp made with glass partition and tested at intense heat yesterday and the one from which the Hydrogen lines were obtained in spectroscope. was broken in the carbon today. Other Lamps were made with Mica partition extending down nearly to bottom of Large globe. one was exhausted on the pump and heated up Mr. Edison then for experiment let air in so the guage mercury filled about threefourths the globe and burned it at high incandescence for long time the lamp showed all the characteristics of lamp with high vacuum and showed the vapory blue the same as the plain Lamps.

Two half length Bart's were gotten out by Bradley and carbonized by Van Cleve, to be made in two lamps in series to replace one of present lamps for experimental use.

Magnetic Separator. Hammer placed a glass between the face of the magnets and the line of fall of the sand. claimed it to work better by keeping the magnets entirely free and permit of no clogging of the magnets.

Wire ~~Lamp~~, representation of Lamps. The wire left in u shaped tube filled with metal solution last night, was examined to day and found to have been reduced at same points and augmented the same as the first experiment made, and the diminution of the wire in both cases represent the points at which the carbons usually break. An iron wire was tried in a solution of common salt and Ferricyanide, Potassium but no light was thrown on the subject by the experiment.

Poles. for telephone wire and conductors for current from Dynamo Station to the Lamp Factory were put up this morning.

Ore Two gentlemen were here to day with Ores and tailings of Dry placer.

Drawings Mr. Hornig made sketches, on three sheets of gear and of engine when equipped with the gear, and gave same to Mott from which to make Patent Office drawings and he is now at work on the same.

Magnetic Brakes. The magnets for one of the small field machines, made with soft iron core and wound three layers of .042 wire was placed on one of the benches in the shop and a square iron mass secured one to each end of core as a base. a bar also of iron was ~~secured~~ taken, about one by two inches and 10 or 12 inches long, placed between the base blocks so the surfaces just touched but not sufficiently to hold the weight of the bar. current was then put on the magnets (about 1/2 of a horse power) and the bar was held in position with sufficient power to hold up a 100 pound anvil. Mr. Edison by exerting almost his entire strength ~~to push it through~~ and could ~~pass~~ push it through. The experiment was made to test the power of magnets in application as Brakes.

Freeman cut nose badly with hatchet. off work.

Paper Loops &c. Mr. Edison directed Bradley to select some test loops with varying imperfections to study the effect in the light and the stability of them when containing pith. hard outside, and irregularities in cutting. Also to make some with a taper of .003. to be tried as an experiment in the carrying tendency of loop. and to see whether it will equalize itself.

Mica partition. A lamp with mica partition mentioned yesterday. was broken this morning by Mr. Edison on the pump by intense current. Another was made and is on the pump.

Half Lamp. One ~~half~~ carbon just one half the length and same dimensions of the long Bast fibers was put in a lamp and exhausted this morning. The lamp was hung in the Photometric Room, and brought up to 36 candles and left at that heat for some time. it was then lowered and gradually raised to twenty eight candles before blue could be observed and then not in clamps but diffused through the entire globe

the Lamp was then gradually carried up to nearly eighty candles and stood nearly a minute before it broke in the carbon. this was unquestionable the finest Lamp ever yet made showing the power & [illegible] of the Bast carbons and opening a new field for experiments.

Mr. Edison made sketches of two of the half-lamps (as they are called) in straight tubes instead of globes and arranged in series Note Book No. 63 page 167. fibres are being cut with which to make several of the lamps ~~and~~ to further test their merits.

Gold Ore. Dr. Moses took a vaporating dish and in bottom placed a carbon plate with wooden frame on edges and extending to the outside of pan. on top of the frame was placed another carbon plate, leaving a space of probably 3/4 of an inch between the two plates. the dish was then filled with salted water and gold ore very finely powdered mixed in. the poles of batteries were then connected to the plates and allowed to remain over night. the object being to have the current

generate chlorine gas in the solution, which will act upon and dissolve the gold which may then be precipitated.

Magnetic Brake Mr. Hornig made sketch of an application, of the principle demonstrated & described under date June 17, for a magnetic brake on cars. The small magnets are secured to the frame of the car. A cast wheel is secured on the axle so that the outer part may revolve between the bases of the magnets, which are secured by bolts, ~~the bases~~ in slotted holes in such way that they may be kept from contact with wheel by a light spring when not used, but when current is given to the magnets the base blocks attract themselves to the opposite sides of the wheel with great tenacity and thus make a powerful brake. The sketches were given to Mott from which to make Patent Office drawings

Small field dynamo. soft iron core, tested by Mr. Upton.

Hot air Engine. The small engine with which the experiments with exhaust steam as fuel were made was to day shipped to Delamater Iron works New-York.

Electric Locomotive was improved in appearance by a thorough painting.

Gold Ore, The experiment commenced and noticed yesterday - was examined This A.M. by Dr. Moses the contents of the evaporating dish were filtered and the very small quantity of the liquid precipitated by Moses showed gold in sufficient quantity to indicate that the operation had done complete work, the liquid and solids were then taken by Dr. Haide. Dr Moses believes the experiment shows the process to be economical especially in ores that do not contain too much metal other than gold. As in presence of other metals the chlorine would act first upon them and leave the gold till the last thus requiring longer

time to do its work than it would in pure gold ore. and the question of economy would to an extent depend upon the time required to complete the process. See June 22

Lamps. Some four or five half. lamps were made to day and two in tubes instead of bulbs put on the pumps ready for exhaustion Monday morning.

Dynamometer. directed to be taken off and belt which has to day been prepared by Andrus to be put on connecting direct from Main to Dynamo shaft.

Absent } Mr. Edison and about all The
Fishing } men except some in the shop, left here about four oclock P.M. to take a Schooner (hired for the purpose) at Woodbridge for an excursion and fish, expecting to remain away until Monday night.

Work general of the week. Several in shop at work on patterns for Motor gear. Men & Ayers team on Rail Road extension. Mr. E. interested and experimenting on Bast fibre lamps Batchelor still absent. Cunningham on small fibre apparatus.

Monday June 21.

Dynamometer. taken off and the main and Dynamo connected by direct Sakt.

Half lamp. Jehl tested one of the half lamps of 70 ohms resistance cold, heated to 11 candles dropped to 40 ohms the test was not completed in consequent of no current in evening.

Specific Gravity. Dr. Moses had Boehm make another apparatus for testing specific gravity. Sketched in Book 68 page 123 The Dr. is good on apparatus (Flora if I felt at liberty to express herein my own private views I should remark he is H— ll on apparatus)

Ties Old laid wood well seasoned ties are being drawn by Ayers from Depot to use on curves and joints of the Electric R. R. One car load of which were ~~stretched~~ delivered them on Saturday.

Glass Visitor. A Glass Manufacturer from Corning N.Y.

Fishing The excursion returned about 10 o'clock This Morning. All pretty well browned, and tired, Engine & shop not running tonight. Too much fish, low water.

Tuesday June 22.

Half Lamp. Two in small tubes were put up in series at about 45 candles to test their stability, average life about 1 hour at that heat. A single full lamp was then put in rather shorter lived at same incandescence. Three other half lamps were sealed off the pump resistance cold. 67, 69 & 81. the loops in regular globes. Two were placed on the wires in series at 56 candles and remained 20 2/2 hours before breaking, These gave 5.4 per horse power at that heat. or the 300 candles per horse power. The survivor was put at 9 candles requiring 2580 ft pounds or 285 ft pounds per candle. And at 8 candles 2520 ft lbs Book No. 48 page 181. &c.

The better economy of the regular globes over tubes is probably due to the small tubes, being nearer the ~~glass~~ carbon, conduct away the heat more readily.

The free fibres as cut now, are 4 1/8 in long by .312 diameter square, and the small ones are same diameter but precisely one half in length. Bradley is now cutting some 2 7/16 in long. have not yet been carbonized.

Electric R.R. Mr. Edison run the motor around the short curve (30ft radius) several times to day. On starting from the Station when current was first put on, the Armature of the newest machine, the second one in series, was burned out on examining it it was found that the solder had melted and commenced the cross at the commutator head, and the armature was entirely unwound. A new magnet and armature were put in and connected up. No test of it has yet been made.

Ore experiment, of Dr. Moses ~~made~~ commenced on Friday June 18. was further examined into this morning by placing the carbon, plates used in the experiment, in a solution, to discover whether they had absorbed any of the gold in the solution. The plate connected to the zinc pole of battery was found to contain a considerable quantity of gold. The solid residue examined by Haid also contained some gold

Office. New Book case being put in today and partition built around the head of the stairs.

Small field dynamo was tested by Mr. Upton as a motor. with Prony Dynamometer, which indicated about 19.440 ft pounds. The shaft of Prony gave out before the test was entirely completed. - Book No. pge.

Bast fibres. Some choice specimens of Bast fibres were brought tonight by Hughes.

Ore. Lawson tried an experiment of depositing silver and gold on soft iron turnings by use of battery current. The ore was taken just as it comes from mine, but no results were obtained. N.G.

Power Mercury Pump. was delivered at Lamp factory this A.M.

Wednesday June 23.

Exp. with copper wire in straight glass tube filled with Water solution, the current being passed through the wire it was eaten off at clamp or connection with carbon pole. An iron wire in form of loop was then placed in evaporation dish with a solution of Salt & Potassium Ferricyanide. In this case the stronger the solution was the more local was the carrying and on diluting it the carrying extended for a greater length along the carbon, next the carbon pole of battery.

Fibre Lamps. One of the half lamps in full globe was tested at 22 candles. 67 ohms cold. burned 3 hours 13 minutes. Three half lamps in tubes sealed off the pumps and heated up. the carbon however was so close to tube that the glass was melted. Full lamp was then tested at 40 candles and gave six per horse power. and lasted at that incandescence for 2 hours & 15 minutes.

Carbonization. John Ott finished a new former by which to cut the slotted nickel plates in which to carbonize bast fibres. and got out a plate or two which were used to day by Van Cleve and several very fine specimens of carbons gotten out by him from them.

Small field Dynamo was set up in the Dynamo Room and belted to shaft of other dynamos. The present pulleys give but 1500 Revolutions per Minute. and current only sufficient to heat one lamp to bright red heat, The pulleys will be changed to run it 2500 Revolutions and better results can be obtained.

Ore Experiment. Dr. Moses having found gold in one table spoonful of the original solution of experiment mentioned June 18. and also in one of the carbon plates used. the experiment was commenced over again today by Dr. Haid and Crosby. the latter Dr. not having found any gold in the solution of the first experiment which he treated.

Nitric Acid. Lawson took some calcium carbonate and made in paste with aqua Ammonia. and immersed the poles of a battery to experiment in making Nitric Acid. after remaining some time traces of nitric acid were found.

Visitors Perkas & Bailey, two other french gents also Livingston a former employee.

Absentee. Clarke gone to Philadelphia and to examine an instantaneous generator.

R.R. Run around the sharp curve to day but the wheel of the counter shaft cramped against the coupling links so hard that it was unnecessary to uncouple and shove the car back around the turn.

Lamp factory Cunningham, Andrus & Johnson commenced in lamp factory this morning by preparing to put up some mercury pumps &c.

Bast-fibre lamps. Small loop at 22 candles lasted. 3 h. 13 m. one at little more than 22 candles stayed 2 hrs. 30 m. Longest life in long carbon today 1 h. 12 m. The most economical was a half lamp and one dipped in Plumbago solution was uneconomical and short lived. The economy varied considerably. Lamps tested in the evening did not show so economical by from 17 to 20 ft. lbs. per candle as the same lamps did in day time, attributed to the reading of the photometer, as in evening, the resistance read lower and the volts higher to give the same candles.

Book. No. 39 - Page 219 to inc.

Gear. Several of the men in Shop at work preparing the gear castings for the electric locomotive.

Carbonized tissue. Dr. Moses appearing to be out of a job Mr. Edison directed him to analize some of the Carbonized tissue paper from the Moulds. and he is preparing for the work.

Magnetic Separator. Mr. Honig is designing the arrangement of magnets and hoppers for a working system of magnetic separation.

Absentees Mr Edison went east on 11 20. Mr. Lawson also absent towards Philada.

Loops. Bradley cut some from Osier willow and some from palm leaf of different sizes and lengths. The willow were carbonized by Van Cleve, but not taken out of moulds today.

Gems. Hidden here today and brought for Mr. Edison some cubes of choice gems and ~~precious~~ rare stones. &c.

Papers The Scientific American now out of date July 3. contains a cut & description of Guests Improved electric Lamp. The improvement claimed being the use of mercury in the tubes for sealing the platina wires and in carbonizing the loop on the wires instead of clamping. Otherwise the lamp is a facsimily of Mr. Edisons Lamp. but necessarily much more expensive.

R.R. Today run around the curve and back with eight persons on the car.

Tests in Vacuum. One of the pumps was put up in photometric room and a regular paper carbon lamp attached so that when lit it would be in position to measure. At very low vacuum it was heated to 16 candles and, as the vacuum increased the illuminating power also increased to 22 candles without any increase of electro motive force and with very slight decrease in the resistance of the carbon. This test proves conclusively that high vacuo is necessary to best Economy.

The battery cells were renewed this morning and the tests today were carefully and accurately made. ~~One bast lamp~~ Book No. 42 page 117 to 173 &c.

One Bast lamp that was tested yesterday tested with old batteries and showed badly at 345 ft pounds per candle required to day with the renewed batteries 234 ft lbs per candle.

Absentees Mr. Clarke ret'd tonight from Phila. reports progress at [illegible] and good [illegible]

Saturday June 26.

Power Mercury pump. was set up in Lamp Factory. Cunningham Andrus & Schroyer there all day.

Willow Loops The Osier Willow loops carbonized yesterday were taken out this morning all broken. very delicate & tender

Bast fibre lamps. One lamp regular size bast fibre. decreased 14 ohms in its resistance after heat put on. at 40 candles low vacuum the blue was very noticeable but after high vac. was obtained the lamp was raised to 60 candles and showed no blue. the lamp when first heated at low vacuum. gave 9 candles and increased with the improved vacuum up to 20½ candles on same electro motive force the clamp remained bright after the lamp had broken. Book No 42 page 175 &c.

A second test of a similar lamp 22

ohms cold decreased to 95 ohms when heated the increase in illumination as the vacuum improved was about same as in previous test.
The lamp was then raised to 64 C. in high vacuum and gave no blue although it showed blue at 44 candles in low vacuum. Tested then for economy. at 14 candles it gave 12.2 per horse power 74.3 ft pounds per candle when at 64 candles Book 42 page. 201 &c.

Ballast Ten car loads of ballast sand dumped by Penn RR for the electric Railway to day near culvert.

Chlorine Exp on carbon. D. Moses having found very little if any thing in the carbonized tissue paper which he had analyzed by request of Mr. Edison. He tonight placed a carbon plate in bottom of evaporating dish. covered it with a

paper carefully laid a number of sheets of the carbonized tissue together on top the paper. and connected one pole of battery to lower plate and the other to the tissue, covered the same with saturated solution of salt & water left to make chlorine and that to work upon the carbonized tissue.

Work general of work. Mr. Batchelor still absent. Ark on former for and getting out slotted plates in which to carbonize Bast fibres. Most of the men in shop on preparing the gear castings for putting on the electric locomotive. Three men during day on R.R. extension and Masty with five men from 6 oclock till dark. Mr. Edison and Upton testing and experimenting with Bast fibre Lamps. Glass blower on pumps.

Simms pile a dynamo. fed five lamps after being fitted with a pulley which run it 2500 Rev per M. Mr. Upton says it will run eighteen lamps

Lamp Factory. Men worked all day yesterday down at Lamp Factory. Men on Rail Road.

Absentees Yesterday Mrs Edison. Upton and Clarke over to the beach. Ino The Morning Mr. Batchelor returned from his trip after an absence of ten days. (since June 16)

Carbonization. Van Cleve carbonized a few loops of Soft porous Bast fiber which came out first class. Also some loops of Palm leaf which also came out very good. they were all put in lamps and one of each prepared for the pump in photometric room, but nothing done with them today.

Small field dynamo tested gave 90 volts. 9 Lamps were put up in Machine Shop and very brilliantly lighted by current from the little machine.

Lamp. Bast fiber Lamp made with small double partition between the clamps was tested resistance hot 113 ohms at 16 candles required 192 ft lbs per candle 12 lamps per horse power. Book No 42 page 229 &c.

Chlorine exp on carbons noticed on Saturday examined this morning the carbon was found to have been effected by the chlorine, proving its impurity and a presence of Hydro Carbons. The experiment was made then by immersing two card board carbons in solution of salt water regularly clamped to sealed wires one connected to each pole of battery. the result showed the presence of Hydro Carbon same as first exp.

Visitors Prof Barker. Collins of Herald. a large party of Havana Cuba. and Bailey & Puskas in the evening. Rail Road. run for the Cubans. Armature of new machine again burned out. no cause could be discovered.

Lamps Tested. One soft bast fibre carbon regular size very blue at 35 candles Book No. 42 page 257 &c continued in No 103. Another of same kind of carbon with resistance of 790 ohms cold, very blue at 44 candles and lasted about half a minute. Regular Bast Lamp resistance cold 194.4 ohms no blue in high vacuum at 40 candles. was sealed off the ~~pump in~~ thirty five minutes after starting the pump.

Palmetto carbon resistance 115 ohms at 13 candles. put at 44 candles and sealed off after remaining at that heat for one hour. Book No. 103 pg 1 &c.

Clamp Machine. Mr. Batchelor is again down to business on the clamp machine

Electric Messenger Mr. Edison to day revived the idea of the electric messenger. and is seriously discussing the putting of it in practical operation for six or eight miles

as an experiment. and the theme this evening is a discussion of the means and appliances ~~for the~~ and superstructure for the trial. See ~~also~~ May 7. 1880

Carbonization Van Cleve carbonized some Bast fibres .005 by .012 & .010 by .010. and got out one willow .012 by .012 which was immediately put in a lamp and tested gave 232 ohms hot. quite blue at about 40 candles and lasted about five minutes. Mr. Upton says it took 71 ft pounds per candle.

Small field dynamo. The magnets of the small machine were wound with 7 additional layers of .035 wire making in all ten layers. It is running at night and furnishing the current for 8 or 10 lamps in the shop.

Visitors Mr. Edison Sen. ret'd from trip in Canada & west.

 Wednesday June 30.

Lamp tests. A Bact lamp .005 x .012 carbon at 19½ candles gave 280 ohms resistance and was a little blue. It was then put at 18 candles which on face of these loops is calculated to be equal to 44 candles on the regular loop. and broke in about 10 minutes. It took 2810 ft pounds or about 90.5 ft pounds per candle Book 103 page 398c.

2nd lamp same size carbon lasted 8 minutes at 18 candles and took 102 ft pounds per candle

Palmetto .012 square broke immediately on turning on the current

Calorimeter and Galvanometer test on paper carbon lamp. 87 Volts. Calorimeter 3810 ft pounds and Galvanometer 3920 ft pounds. Book 103.

Small field dynamo again taken apart and two and one half layers of .022 wire wound on magnets making now about 100 ohms of wire on them. set up and running the 9 lamps in machine shop [illegible]

Capillary traction. Some question having ~~arisen~~ been raised as to the effect of the size of the gauge tubes on the reliability of the readings. Boehm made a U shaped apparatus of glass tubing one side about one eighth of an inch bore and the other side of same gauge tubing and put in about 3 inches of mercury. the mercury stood in the large tube about ¼ of an inch above that in the small tube. (showing much less difference than was expected).

Stop cock. Mr Andrews devised and made a sketch of a simple and easily managed and constructed stop cock for use on the mercury pipes leading to the vacuum pumps. The principle is to have a rubber cylinder or valve: worked by a screw and to press squarely against the direct flow of the mercury. by conducting the mercury from the main pipes ~~at direct~~ by openings in the sides and at direct right angles with

the main pipes into a reservoir in which is worked the rubber valve or disc by the raising of which both the inflow and outflow holes are opened and by screwing the disc down nearer the bottom of reservoir this flow is diminished and when screwed down firmly the flow is stopped entirely.

New Mineral Dr. Moses claims to have discovered a new mineral in some ores sent here for assay from California as described by him, it resembles in appearance chromite but differs from it in its chemical composition and in streak

New Mould or carbonizing furnace was devised and sketched by Mr. Batchelor. It is a nickel box of size sufficient in depth to hold 30 slotted plates. the bottom of one serving as a cover or lid for the one beneath. each entire plate in this way requiring about 1/8 of an inch. The plates are only large enough for one loop at a time. and the box or mould filled with the plates is designed to be used in a gas furnace which will be devised expressly for the purpose.

Visitors Lowery. and a friend and Mr. Philips

Absentees Mr. Edison went east (probably to New York) at 11 20 and returned at 5 30 with Lowry & friend.

Thursday July 1. 80

Conductivity of fibre carbons, estimated Book 103 pge 63 &c.- Manila .005 diameter by 2.4 inches long. 505 ohms resistance cold, or 5.205 ohms per mil ~~foot~~ inch. Bast .012 by .012 square 195 ohms cold or 7.099 per mil inch. Palmetto 0.0124 .012 square 5.207 per mil inch.

Electric Messenger. Mr. Edison directed Hornig to devise and make diagram of a Motor geared expressly for speed and as light as practicable to be capable of 200 miles per hour for messenger.

Andrews at work on the superstructure of track to be carried around a circle of 1000 feet diameter to make an experiment of the utility of the invention.

Lamps. During the day, six of the lamps in the shop run by small dynamo have broken - four in the glass and two only in the carbon. The carbons remained unbroken in all those that broke in the glass.

Gas Works for Lamp factory started out by Mr. Kruesi and Ayers commenced drawing down brick for use therein.

Armature. burned out the other day while running the railroad June 29 had the coils replaced with fresh wire and tested ready for use.

Work. All shut down at eight o'clock to give those so inclined, an opportunity to go to Uniontown to election of School directors.

Gas furnace Mr. Batchelor is today designing and making diagram of a gas furnace for carbonizing.

Friday July 2d 1880

Pumps. The glass blower finished the two hundred of the pumps and men have today been carrying them down to Lamp Factory.

Four lamps were attached to one of the pumps today and after excellent vacuum had been obtained. Mr. E. was showing the pumps to Prof Barker and F. Thompson of Penna Rail Road when the mercury for some unaccountable reason flowed up into the lamps entirely destroying the vacuum and two of the lamps. Four others were then attached and sealed off about [illegible] two, after breaking two

Wood Miller. Dean today is trying to put his face cutting attachment for the lathe for working wood loops it is a very complicated neat piece of delicate and compact machinery but too incomplete yet for an attempt at description.

Crucibles for Assays. Cunningham finished a mould in which to press suitable material into form for the small crucibles which

are used in the final process of assaying and tried it several times with chalk it worked very nicely and he got out a few very perfect specimens. The mould is made of iron, composed of a base in the center of which is a round raised piece to form the cavity of the crucible. on top is placed a cylindrical part with hole through the center, widened near the bottom into shape of reversed or up side down funnel. plungers are fitted very snugly to ~~fill~~ the hole, or bore and after the material is placed in, the plungers are inserted ~~placed~~ and pressed down in the bore. the base and cylinder being separate but neatly fitted together and the one lifted from the other & the crucible easily to be easily removed.

R. R. Station Martin Force removed the platform from the end of Rail Road Station & changed the wire connections to one side of the building preparatory to remove the end of station for continuation of road.

Magnetic Separator. design for the practical working of the magnetic separator was completed and sketch of the same given to Mott from which to make Patent Office drawings. capacity and specifications in Book No. 80. page 200 & 201.

Lamps & Magnetism I find in Mr Uptons Book No 103 on page 275 quite a descriptive list of experiments requested by Mr. Edison to be made on platina wires in air and vacuum, also ~~on the~~ to determine whether an active armature contains any magnetism. and some others.

Loops. None but regulars have been carbonized today. but Bradley has gotten out some more of the Palmetto loops and was directed by Mr. Edison to cut, on the same former used for bast, some out of manila glazed card board and also try rye straw some of which I got for him.

Visitors. Mr. Welles, also a Mine Prospector of Leadville Col.

Absent! Wilson & Clark started for 4th July trip

Journals of Armatures. Cunningham to day has been turning out the inside of the brass boxes of Armature bearings and running in them Babbit Metal.

Ore. A package received this morning from Rock Mass. and by Mr Edison was found to contain Gold. the first he has found in Massachusetts ground.

Pump. One of the pumps was taken out and the connection between the Sprengle drop tube and the gauge tube was made small and crooked (to prevent for experiments on testing for leakage or coming from any cause of the vacuum as possible the up flow of the fall returning into the gauge tube and lamps)

R.R. Station The end ~~[illegible]~~ taken out of the Station in preparation of extending the track and doing away with the bumper.

Magnetic brake. Logan put brake wheels on the axles of one of the cars and turned

And polished them preparatory to putting on the complete brake

Locomotive, ~~Large~~ Electric for ~~heavy rail roading~~ was roughly sketched by Mr. Edison. The Armature is ~~Geared~~ made on a sleeve over the driving axle and secured there by clutches. I should judge the purpose to be to get high speed with very simple gear.

Pullman Palace Car was put on track the Blue room.

Rail pattern. Andrus ~~was~~ making the pattern for the elevated messenger road (The cross section of the rail would pretty well represent a capital Z reversed. Ƨ)

Drawings. Magnetic brake applied to Ordinary Rail Road car were made by Mr. Edison and given Mott from which to make P.O. drawings

Carbonization. ~~Some~~ carbon was dipped in a solution of Ammonium Salts & Platinum and one in Chloride in Alcohol and after drying were recarbonized and came out very nice.

Work general of week. Mr. Batchelor Ott & Crew on Lamp Machine. Mr. Edison & Upton, testing lamps and experimenting on carbons. Pump power put up in Lamp Factory. Men on R.R. extension. General in Shop on Gear of Electric Locomotive. Glass House on pumps. Carpenters on Cars & Elevated messenger rd.

Note On my return this morning to my post of duty after an absence since Saturday afternoon, I find:

Brake and Light Application } Sketch by Mr. Edison of the arrangement and application of electricity to the brake and lighting of Locomotives and ordinary Rail Road cars. The dynamo for current to both brakes & lights is secured in front of Locomotive over the cow-catcher, and current controlled by ~~[illegible]~~ line & switches managed by the Engineer from the engine cab. ~~The current is~~ Also

Carbonizing Moulds & Fibre Tools } were sketched by him ~~[illegible]~~ of which were given to Mott from which to make Patent office drawings.

Electric Canal Systems } And I find in Mr. Kruesi's office Sketches of two systems of operating Canals by Electricity. One consists of carrying the current along the Canal by

suitable conductors from which the current is carried to motor, on board of boat, which ~~[illegible]~~ drives a screw propelling wheel. The other is for track laid along the tow path ~~and~~ over which a motor with hand-over hand clutch gear travels and by line or otherwise and tows the boat or boats.

Applications to be made } I find in Mr. Edison's Book 108 page 3 &c. A list of applications to be made of the system for power, lighting &c. both for land and submarine purposes where light or power or both may be useful. and

Left. That on Monday Crosby and Lawson left for the west.

Armatures. Two were slightly damaged yesterday by a cross. and heat

Foundation Men had commenced digging for the foundation, for the Porter Engine alongside the boiler room

 Wednesday July 7-80

Slotted Plates. John Ott made a couple large slotted plates to hold six inch fibres and I am believe carbonized two of that length, in the new plates and new long, straight moulds, that have lately been received. the carbons came out very nicely.

Fire brick. Are being drawn by Ayers for the arrangement for burning coal dust under the boiler.

Fibres. A collection of Bamboo. Reed and choice Bast have been obtained and some loops cut out but none yet put in the lamps to test.

Vacuum test. In furtherance of trial of vacuum mentioned under July 3. A lamp was sealed direct to the pump and after good vacuum the pump was sealed apart at tube connecting the drop with gauge tube. and lamp seemed to remain burning for a long time: no fall could be observed for some time. but finally a small bubble of air was let or leaked in and vacuum dropped accordingly. but very immediately began to improve again, without working the pump, showing that the air was either absorbed or used up in the oxidizing the carbon. (part of the above added to note of July 3)

Working drawings. Mr Edison has Horning or at least requested him to make working drawings of the applications of the current for light and power as per list on page 3 of Book 108 mentioned under Notes of work during my absence (Pneudent)

Magnetic Brake. The box or Pullman car was painted, raised up on blocking preparatory to putting on the magnets for brake. which Smith is preparing, and has nearly ready for their uses

Multiple Arc. One of the armatures burned yesterday was repaired and set up today. Machines connected in Multiple Arc, but did not ... when brought to this Train up. Connection in series they appeared to give better results

Thursday July 8.

Sparker & Lamp. Mr. Edison sketched on page 145 Book 68 a lamp with spark tube attached for the purpose of further observations on the loss of vacuum. One sealed off the pump last night and was tested to day. The sparker was connected with the condenser and two batteries. and the lamp on the Dynamo current. According to the color in the sparker, the vacuum lost some. Book No. 104 page 10 &c.
Mr. Edison directed Francis to have the sparkers made of .006 platinum wire in place of heavy long aluminium

Fish plates. Mack Force went over the track of Tramway to day and tightened up all the fish plates. and down at the top of the hill removed one from each rail. to break the connection and save the loss occasioned by fresh dirt &c. being thrown on the rails below where the men are at work on the extension.

Long Bast. Two lamps of six inch Bast fibers were made to day and tested. the first tested 200 ohms resistance. 8 per horse power at 16 candles. set at 44 candles showed no blue and lasted twenty minutes. Second one 147 ohms resistance less economical and blue at 44 candles burned forty minutes when engine stopped. Book 104 page 18 &c.

Poles. Two very long poles were delivered on the ground and one of them raised at the lamp factory for the ~~stimulators~~ wires for power ~~and~~ telephone.

Brake Magnets. The magnets for the Magnetic Brake were wound with six layers of 0.032 wire and the Power run till twelve o'clock to finish them up ~~for~~ ready for putting on in the morning.

Visitors. McMahon, and McLaughlin with three California friends, also Mr. Wilber a short time.

Friday July 9.

Papers. Scientific American date July 17 contains a cut and description of Edison's Magnetic Plast separator. Also cost of maintaining horse power per hour from experiments and observations made by Bissinger. Steam engine 100 horse power 7.6 per horse power per hour. Same 2 h. p 44 5 do. Lehmann's Caloric Eng. 2 h-p. 26.5 do and Otto Gas Eng. 2 h.p. 26.4 per horse power per hour.

Screw Gear was set running in the lathe to scour the cog bearings.

6 in Carbons. The lamp which remained burning when the engine stopped at twelve oclock last night was broken this morning by having the electro-motive force run up, in attempting to set it again at 44 candles.

A second lamp was put on the pump and tested. 275 ohms cold. 174 ohms hot at 16 candles and gave 6.9 per horse power. Set at 44 candles it lasted about one hour.

Wood Miller. Dean is running the four face cutting tools of new ~~wood~~ loop miller, from one counter shaft which ~~being~~ ~~hinged~~ having the bearings hinged and being weighted acts also as a tightener and allows of the carriage in which the cutters are secured, to be moved backwards and forward without any strain on the belts. He did not try it practically to day but merely run for awhile to wear and polish the bearings.

Captive Baloon. Mr. Batchelor made an apparatus to experiment on an Electric Captive Baloon. An upright pair of

288

Magnets are used and the motor armature made to revolve between the poles parallel with them on shaft extending above and on the end of which is a wheel ab[out] ten inches in diameter made li[ke] and on same principle of larg[e] wind mills. the current being turned on the motor causes the wheel to revolve rapidly and by the action of the slanted tin fan[s] against the air gives it the tenden[cy] to rise, but in the trial to night the tendency would not overcome the w[eight]

Sketch by Edison Book No 118 pg 142

Magnetic Brake. was completed and with the new car. the car run [and] and heated by one trip down an[d] back. I judge the brake did give entire satisfaction as I coul[d get] no information about it and being when the trial was made. could not [be]

to... [illegible]